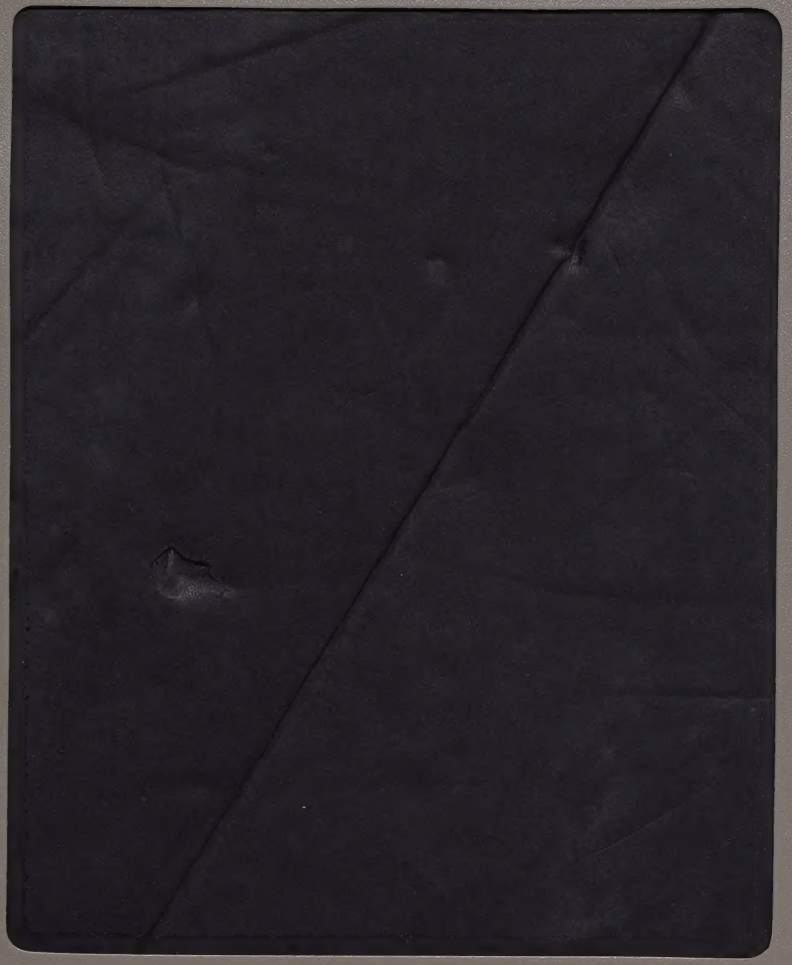
# 1771A
# Intelligent Digital Plotter

User's Manual

FLUKE®



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# 1771A
# Intelligent Digital Plotter

## User's Manual

P/N 699116
June 1983
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Section 1
Introduction

## 1-1. INTRODUCTION

1-2. The John Fluke 1771A Intelligent Digital Plotter includes a software package that allows the Fluke Instrument Controllers to easily operate the Fluke 1771A Plotter. The 1771A software package simplifies the task of graphically plotting data or otherwise presenting data in a meaningful manner. This manual is meant to describe that software package.

## 1-3. SETUP DATA

1-4. The following two types of setup data are input:

1. Identifying data such as:

    a. Titles

    b. Author

    c. Department

    d. Division

    e. Company

    f. Date

    g. Time

    h. Slide number

NOTE

If it is temporarily desirable to omit any of the setup labels, simply enter a blank (press space bar) when that particular input is requested. Labels may be offset to the right by entering blanks ahead of the label text.

2. Measurement data such as:

   a. The x/y coordinates

   b. The bar heights

   c. The bar labels

   e. The axes limits

   f. The pie percentages

   g. The pie labels

   h. The tic limits

1-5. Both types of setup data are stored in virtual arrays which offer the following advantages:

1. The random access of virtual arrays allows the editing of single items of data without the user having to re-enter data which has already been entered correctly.

2. The data is stored automatically. A program can be interrupted at any place using CTRL/C without losing data.

3. The data doesn't require space in main memory.

1-6. PROGRAM OVERVIEW

1-7. The IEEE-488 Bus and plotter are automatically tested before plotting begins. Prompts remind the user to check such things as pen, paper and chart load switch. Plotter scaling is automatically handled by the Controller. The "lower left" and "upper right" for a particular plot are stored in a virtual array. The IEEE-488 error handler allows for accidental removal of power or bus cable from the plotter during plotting without loss of plotting continuity for all programs except LABELS.

1-8. The Instrument Controller makes most of the plotting decisions, minimizing set up time. Identifying set up data is automatically centered and placed on the plot. Time and date are input from the Controller system variables. Operator inputs are checked for errors and the operator is given prompts to aid in correction of erroneous inputs.

1-9. There are three storage directories for the identification and selection of setup data. Assignment of file names for setup data is automatic and easily identifiable.

1-10. The touch-sense feature of the Instrument Controller's display has been used wherever possible to speed up task selection and eliminate operator confusion.

1-11. Working examples for each program are present on the disk. The operator merely has to step through the instructions of each program, using one of the examples provided to produce a finished plot within a few minutes. The written instructions need only be used once; since all programs are self prompting, they guide the operator in the use of the program.

1-12. Programs are selected from a menu which may be recalled at the end of any program.

1-13. RELATED DOCUMENTS

1-14. Related documents that may be of use are as follows:

1. 1771A Command Structure/Protocol Manual
2. 1771A Operators Instructions Manual
3. S1717 Editor Accessory User Manual

CAUTIONS

It is a good practice to back up your programs on a second disk (see Transferring Files to Another Disk, Appendix A).

The disk for the Plotter is completely full. Any alterations of program code should be performed only after copying the program to another disk which has ample room for more program code.

If the Plotter floppy disk is copied onto the E-Disk, all virtual array updating will occur on the E-Disk. Final results can only be saved by copying the E-DISK back onto the floppy disk after all plotting is finished.

Do not write protect the working version of this disk. Do write protect your backup copy.

## 1-15. ORDERING INFORMATION

1-16. The following parts of the 1771A may be ordered from your nearest Fluke Sales Office. Specify the appropriate Fluke part number when ordering.

1. 1771A Plotter Package User Manual - part number 699116

2. 1771A Plotter Package Floppy Disks. Should you erase or otherwise damage the program disks, return the damaged disks to your nearest Fluke Sales Office and request new disks under Fluke part number 699090 for Disk 1, and 699108 for Disk 2.

3. IEEE-488 Bus Cable - part numbers
   Y8001 - 1m.
   Y8002 - 2m.
   Y8003 - 3m.

4. Replacement Pen Sets
   696724 Black, Hard Nib
   696732 Hard Nib Pen Kit (one ea. Black, Red, Blue, Green, Violet and Orange)
   696740 Black Mylar Film (India Ink)
   696757 Mylar Film Kit (India Ink Fibre Tip Pens, one ea. of Black, Red, Blue, Green, Violet and Orange)
   696716 Clear Mylar Film (100 sheets of 8.5 in. x 11 in.)
   697144 Kit for Single Drafting Pen

## 1-17. 1771A PLOTTER SPECIFICATIONS

| | |
|---|---|
| Paper Size (surface area) | 8.5 in x 11 in (21.6 cm x 27.9 cm) |
| Plot Size | 7 in x 10 in (17.8 cm x 25.4 cm) |
| Speed | 2.8 in/second (71 mm/second) |
| Step Size | 200 increments/in (8 increments/mm) |
| Mechanism | Reversible stepper motor complete with drive electronics for bi directional movement |
| Interface | IEEE-488 Bus |
| Mating Input Connector | IEEE-488 Bus Cable |
| Physical | Height: 6 in (15.2 cm)<br>Width: 17 in (43.2 cm)<br>Depth: 10.5 in (26.6 cm) |
| Power Requirements | 115V @ 50/60 Hz alterable to 230V @ 50/60 Hz |
| Controls | Remote, Manual and Pushbutton Controls to position pen |
| Paper Hold Down | Mechanical |
| Plotter Weight | 17 lb (7.7 kg) |
| Shipping Weight | 20 lb (9.1 kg) |
| Software | 2 floppy disks (5 in) |
| Operating Temperature | +65 to +95 degrees F<br>+18 to +35 degrees C |
| Storage Temperature | +32 to 160 degrees F<br>0 to +71 degrees C |
| Humidity | Rel. 20% to 80% |
| Environment | Office |

# Section 2
# Menu For Plotting Programs

## 2-1. INTRODUCTION

2-2. The information in this section describes system setup, Controller initialization, program selection, and various 1771A Plotter Application programs. A quick demonstration of the XYPLOT, BARPLT, and PIEPLT subroutines is provided at the end of the section.

## 2-3. SYSTEM SETUP

2-4. Figures 2-1 and 2-2 show the system setup for a Fluke 1771A Plotter and an Instrument Controller. Complete the following procedure to make this system setup.

1. Connect the rear of the Fluke 1771A Plotter to Port 0 of the Controller via an IEEE-488 cable.

2. Connect both instruments to line power.

3. Set the plotter address switches to 5 and enable the IEEE-488 Handshake time-Out (00101000).

4. Turn both instruments on.

## 2-5. CONTROLLER INITIALIZATION

2-6. Use the following procedure to initialize the Instrument Controller:

1. Insert the 1771A Floppy Disk 1 or 2 (no. 699090/699108) into the Controller. Do not write protect this disk.

2. Gently close the door to the floppy using several partial closures to seat the disk.

3. Press the RESTART control.

4. The Controller should display "Command file active".

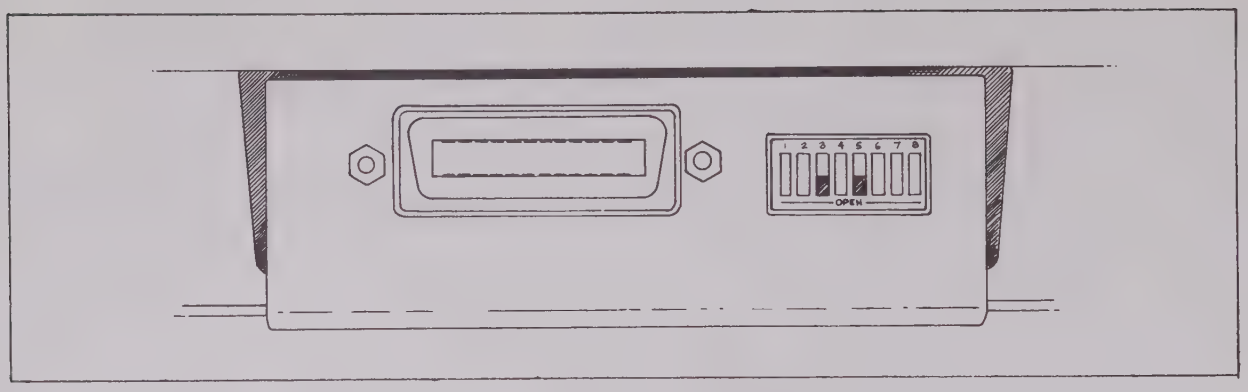



Figure 2-1. Plotter Address Switches

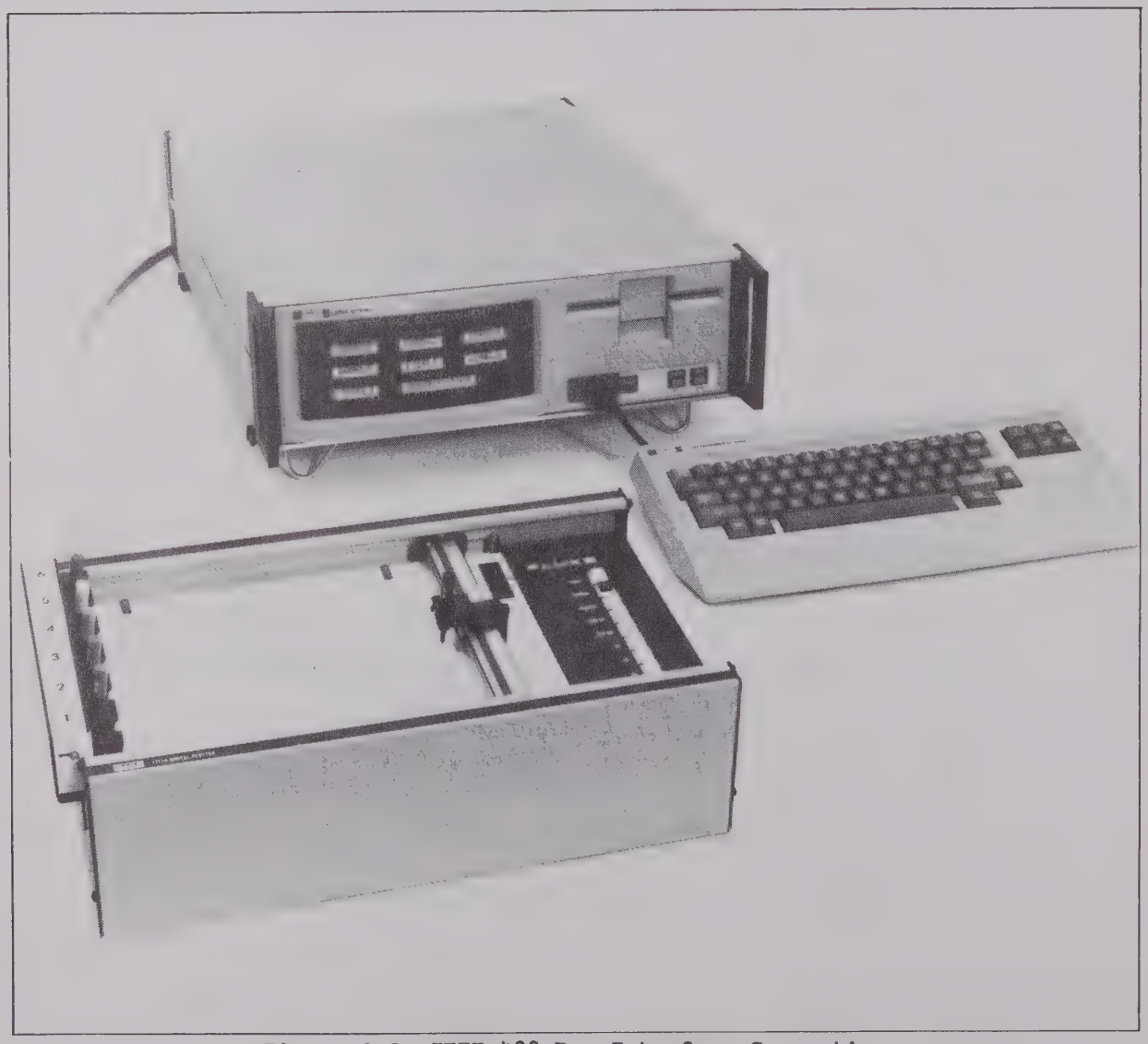


Figure 2-2. IEEE-488 Bus Interface Connection

5. If the Controller displays "Enter DD-MM-YY", enter the date and time as follows:

   a. Enter the correct day, month, and year followed by a RETURN. For example, the key sequence for June 5, 1980 would be:

      5-6-80<CR>

   b. Enter the correct time in hours and minutes followed by a RETURN. For example, the key sequence for 3:47 PM would be:

      15-47<CR>

6. The next display is shown in Figure 2-3. In the remainder of this manual, this display or the complete list of options displayed is called MENU.

## 2-7. PROGRAM SELECTION

2-8. Touch the display shown in Figure 2-3 on the appropriate box to select the program you wish to run. The selected program will automatically be loaded and will begin to run. Proceed to the appropriate instructions for the selected program. Explanations for the program names appear in the Program Description material that follows. When the MENU (Figure 2-3) is displayed, pressing CTRL/C causes the Controller to dislay the power down instructions.

## 2-9. PROGRAM DESCRIPTIONS

### 2-10. Introduction

2-11. The following paragraphs briefly describe the 1771A programs: USERS1, USERS2, PLTDRV, XYPLOT, BARPLT, PIEPLT, LABELS, and TXTPLT.

### 2-12. USERS1 Program

2-13. USERS1 simulates the user's data acquisition by generating 11 data points for the function Y = (1/X)*$5^X$ for the range of 1.01<=X<=10.01 (where * indicates multiplication). USERS1 then chains in the plotter driver program, PLTDRV, and the data is automatically scaled by the Controller and plotted by the plotter. When the plotting is done, PLTDRV automatically chains USERS1 back into main memory and again runs this calling program.

### 2-14. USERS2 Program

2-15. USERS2 is similar in purpose to USERS1. The function for USERS2 is Y = SIN(X) (where SIN is sine) for the range of -4pi<X<+4pi. USERS2 generates 161 data points in order to plot a reasonably accurate sine wave. Allow enough time for the data to be generated and scaled.

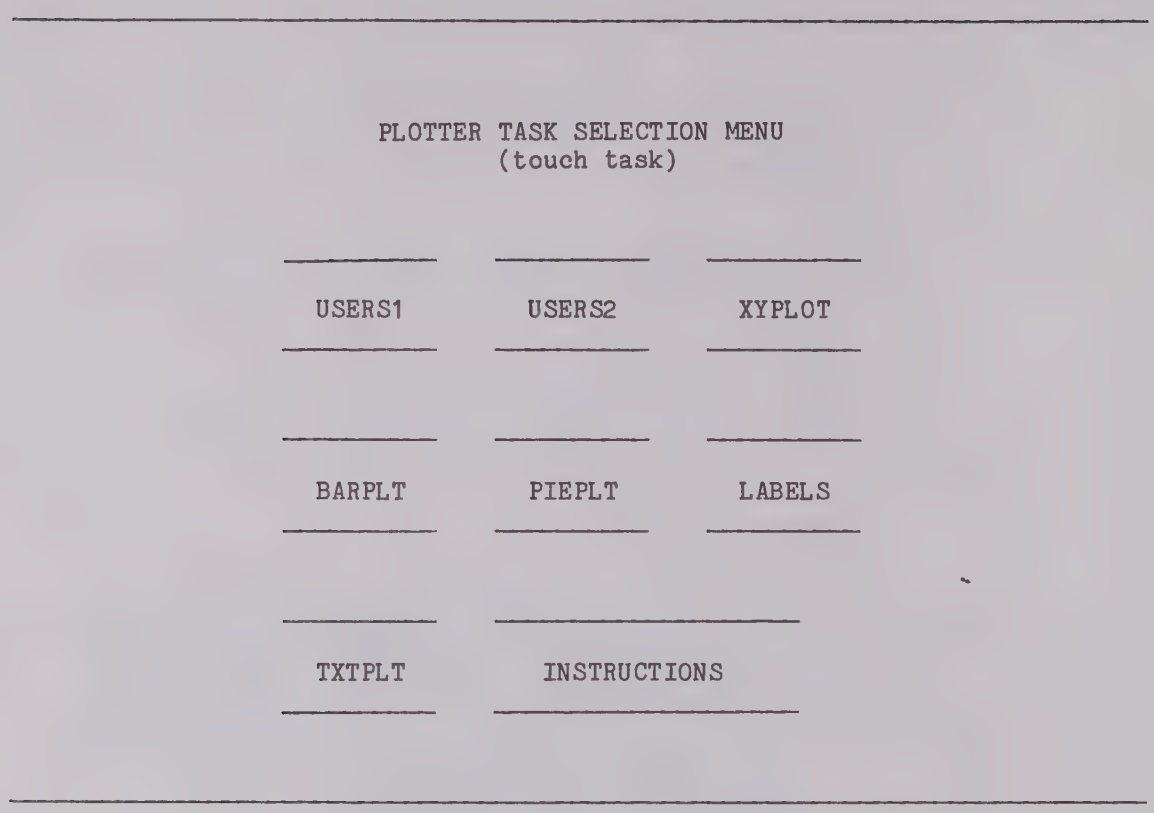



Figure 2-3. Plotter Program Menu Display

## 2-16. PLTDRV Program

2-17. PLTDRV is the Plotter Driver program. PLTDRV is accessible from the MENU through USERS1 and USERS2. PLTDRV is designed to be chained in by a user's program to plot data that has been stored on the disk in virtual arrays. Example data generating programs, including titles are stored on the 1771A Floppy Disk as USERS1 and USERS2. These programs automatically chain in PLTDRV. Axes Scaling and Range are assigned based upon the data being plotted. When the plot is finished, the program which generated this data (USERS1 or USERS2) is chained back in. The plot may then be repeated by following the display prompts. PLTDRV should be copied onto the disk that is intended for use with asssociated programs which will be calling (chaining in) PLTDRV. Spaces and comments have been stripped from PLTDRV to decrease loading time and storage space. PLTDRV may also be added to a main program as a subroutine.

## 2-18. XYPLOT Program

2-19. XYPLOT is the log/log, linear/linear, linear/log, or log/linear graph plotter. XYPLOT allows the user to interactively customize an X/Y plot using keyboard or disk data. The data generated by USERS1 (ARRAY1.VRT) or USERS2 (ARRAY2.VRT) can be input from the disk via XYPLOT to customize the scaling and axes.

## 2-20. BARPLT Program

2-21. BARPLT is the bar graph plotter program. BARPLT allows the user to interactively customize a bar graph plot using disk or keyboard data and to store the bar plot as a virtual array.

NOTE

A histogram can also be plotted using the combined capabilities of the XYPLOT and BARPLT programs. A histogram differs from the barplot in that the X axis of the histogram is dimensioned into cells. Consequently, there are no spaces between bars; each bar of a barplot usually represents a different parameter while the bars of a histogram all represent the same parameter.

## 2-22. PIEPLT Program

2-23. PIEPLT is the pie chart plotter program. The program allows the user to interactively customize a pie chart plot and store it in a virtual array. Data may be alternately plotted in horizontal or vertical orientation without having to enter the data again.

## 2-24. LABELS Program

2-25. The LABELS program allows the user to place additional labels, to identify or describe as needed, on any previously described graph or chart. Since this type of labeling is at the user's discretion, the user must manually locate the pen at the desired location for the label.

## 2-26. TXTPLT Program

2-27. TXTPLT takes any ASCII formatted file and plots the characters in that file. An ASCII file may be created by the ESX editor supplied with the plotter. This allows you to plot large amounts of text to create lists or view graphs for presentations.

## 2-28. QUICK DEMONSTRATION FOR THE XYPLOT, BARPLT, AND PIEPLT PROGRAMS

2-29. Complete the following steps to perform a quick demonstration for the XYPLOT, BARPLT, and PIEPLT programs:

1. When the STORAGE DIRECTORY is displayed:

   a. Touch the associated number for any setup title other than "AVAILABLE".

   b. Touch "LOAD".

2. When the DATA CHOICE is displayed, touch "PLOT PREVIOUS".

3. Next, "SET UP DATA" is displayed. Press RETURN.

4. When "Verify Axis Box" is displayed, touch "CONTINUE".

5. Follow the display prompts.

6. Touch "USE EXISTING IDENTIFIERS" when the following is displayed:

| ENTER NEW IDENTIFIERS | USE EXISTING IDENTIFIERS |
|---|---|

7. Follow display prompts until plot is finished.

Section 3
Plotter Driver Program (PLTDRV)

## 3-1. INTRODUCTION

3-2. The information in this section describes the Plotter Driver Program, PLTDRV. PLTDRV drives the Fluke 1771A Plotter via the IEEE-488 Bus. PLTDRV allows the user to plot data which has been previously stored in virtual arrays.

3-3. The Plotter Driver Program is designed to be chained in by the user's calling program. When the plotting is finished, the user's calling program is automatically chained back.

3-4. The Plotter Driver Program requires the user's data to be in the following four virtual arrays:

1. LB$(2%) for X-axis title, Y-axis title and Plot title.

2. NM$(2%) for Data File name, calling Program name and a string containing the following items:

    a. Flag for printing axes & titles.

    b. Number of points to plot.

    c. Dimensioned size of data array.

    d. optional line style.

    e. optional point symbol.

    f. optional pen number.

3. XC (user's dimension) for X-coordinates.

NOTE

See the explanations in Section 4 and Appendix A for alternatives for X and Y data which have been stored as single array or a two dimensional array.

4. YC (user's dimension) for Y-coordinates.

3-5. No other information is required. The plotter driver program automatically makes the logical choices, based on the user's data, for axes, tics and tic numbers. Data points are marked with the optional point symbol, if specified, unless the number of points exceeds 25 then no point symbol is used.

3-6. The Plotter Driver has the capability to plot in any of the four quadrants, including combinations. Examples are shown in Figure 3-1.

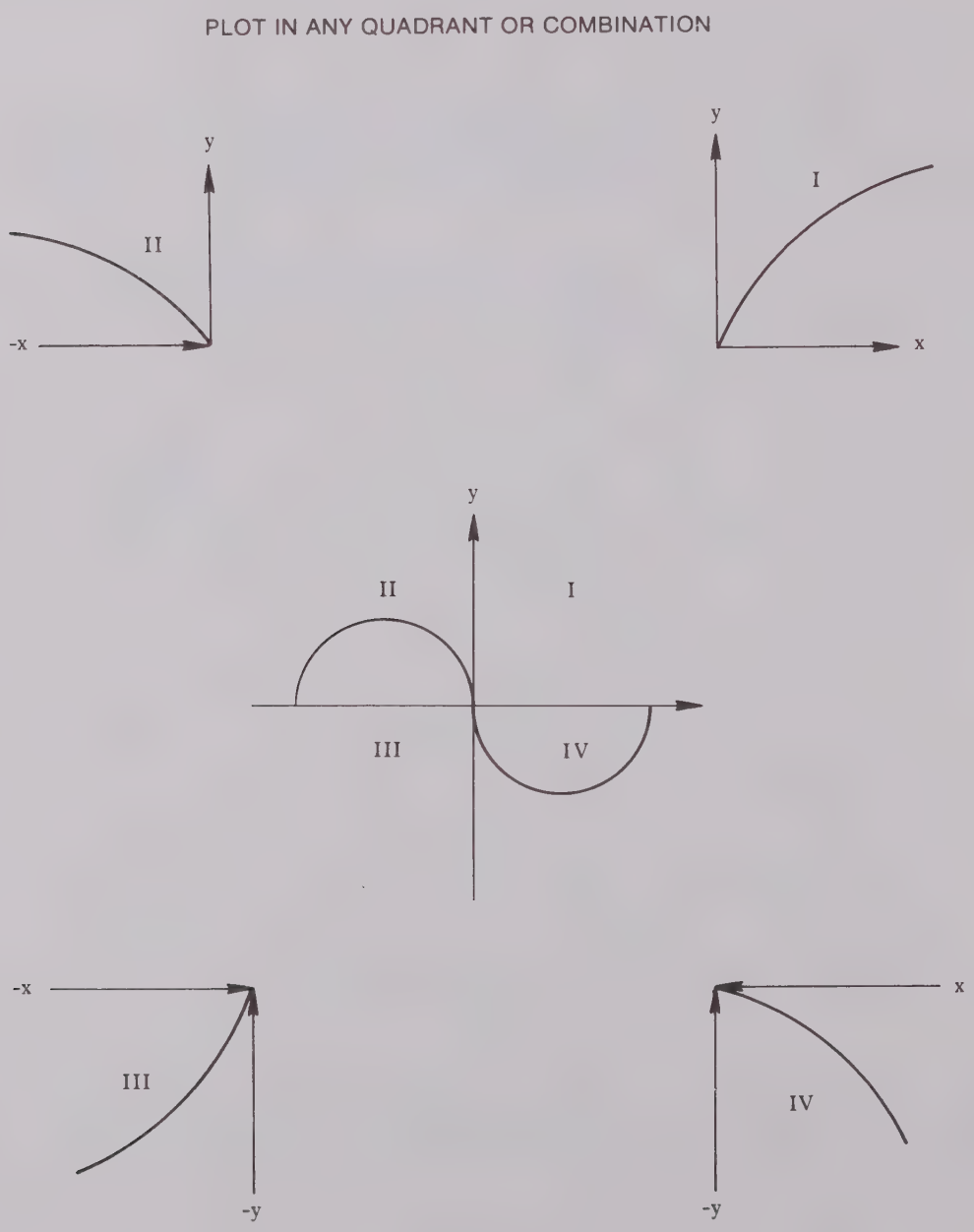



Figure 3-1. Examples Plots In Any Quadrant or In Any Combination of Quadrants

3-7. The Plotter Driver is written with all plotting parameters available as variables. This enables the user to easily modify or customize this program if desired. A sample plot with these variables illustrated appears in Appendix A. The program code is fully commented to explain it's operation. Subroutines are modularized and their code may be extracted and used in other programs the user may want to write.

3-8. SIMULATED USER'S PROGRAM

3-9. A listing of a simulated user's program is located at the end of this section. Only the boxed in lines need to be included in the user's program which calls the plotter driver. Table 3-1 presents some notes about the simulated user's program.

3-10. The example user's program may be selected from the MENU program and then executed by following the prompts on the display. The user may plot any function by programming the function and replacing line 4250 through 4290 with the new function.

3-11. When the example users program is in main memory, press CTRL/C to return to the MENU.

3-12. PASSING ADDITIONAL PARAMETERS

3-13. PLTDRV is already set up to receive three more passed parameters: line style, print symbol, and pen number. The choices for these parameters are presented in the set up portion of the XYPLOT program.

3-14. When these additional parameters are passed, line 4070 of the USERS1.BAL program would be structured as follows:

```
4070 NM$(2%)= "print flag, No. of Points, Dim Size, Line style, data
symbol, pen number".
```

3-15. The following statements show example use of passing additional PLTDRV parameters:

```
4070 NM$(2%)="0,11,10,6,3,4"
4070 NM$(2%)="0,11,10,5,7,2"
```

3-16. PLTDRV takes the value of each of the first three parameters, but uses the last three parameters in string form.

3-17. If more parameters are to be passed, refer to Appendix A: Program Specifications for PLTDRV.

## 3-18. PLOTTING FAMILIES OF LINES

3-19. Families of lines may be plotted by using the print flag to suppress re-scaling and axis plotting. The first line plotted must provide scaling and axis plotting. Subsequent lines of data will be subject to the scaling limitations. If data exceeds the scaling range, the plotter will show an "out of limit" error which is not fatal to the program. Lines may be identified with different choices of line styles and/or point symbols (see the Passing Additional Parameters material presented earlier).

Table 3-1. Notes on the Simulated User's Program

| LINE NUMBER(S) | COMMENTS |
|---|---|
| 2520 through 2560 and 4310 | Channel numbers other than 1 and 2 can be used. Any channel from 1 through 6 can be used. |
| 2530 | The name "DRVSET.VRT" may not be changed; the Plotter Driver requires this name. |
| 2550 and 4050 | The name "ARRAY#.VRT" must be changed to whatever name the user used to store the data which is to be plotted.<br><br>Delete "NEW" in line 2550 for existing data or the Controller will erase the existing data. |
| 4060 | The name "USERS#.BAL" must be changed to the name of the user's calling program or to the name of whatever program the user desires to chain in after plotting. |
| 2560 | This line simulates the dimension statement for the user's data. The variable names are not critical, but their order cannot be changed, and they must be reals.<br><br>If the data already exists in this form as a virtual array on a storage device, then line 2560 is unnecessary and references to file 2 are unnecessary. |
| 4070 | The order of these numbers may not be changed, and the commas must be used. The third number must be the data array dimension. The center number may not exceed the last number by more than 1. If the user wants to plot only the first 5 points in the arrays from file ARRAY1.VRT he would change NM$(2%) as follows:<br><br>4070 NM$(2%)="0,5,10" |

| | |
|---|---|
| | If the user also wanted to suppress re-scaling the plotter and the re-printing of the axes (don't supress scaling until the axes have been plotted), he would change the leading 0 in NM$(2%) to a 1:<br><br>4070 NM$(2%)="1,5,10" ! |
| 8720 | PLTDRV is the name of the Plotter Driver Program. |

## 3-20. SIMULATED USER'S PROGRAM LISTING

CAUTION

**Delete "NEW" in line 2550 of the simulated user's program for existing data or the Controller will erase the existing data.**

CAUTION

**In line 4070, do not supress scaling until the axes have been plotted.**

3-21. The simulated user's program listing follows this paragraph. Figures 3-2 and 3-3 are plots that result from running the simulated user's program.

```
10 ! FILE NAME: "USERS1.BAL"
20 ! VERSION 1.1, 19 JANUARY 1983
30 !
200 !******** DISPLAY SET UP
210 !
220 ON CTRL/C GOTO 26020
230 ES$=CHR$(27%)+"["      ! ESCAPE CHARACTERS
240 CH$=ES$+"2J"+ES$+";H" ! CLEAR SCREEN
250 DK$=ES$+"5p"   ! DISABLE KEYBOARD
260 DS$=ES$+"1p"   ! DOUBLE SIZE CHARACTERS
270 EK$=ES$+"4p"   ! ENABLE KEYBOARD
280 BP$=CHR$(7%)+CHR$(7%)+CHR$(7%)+CHR$(7%) ! BEEP
290 PL%=5% ! PLOTTER ADDRESS
300 PRINT DS$;CPOS(2,5);'CALLING PROGRAM "USERS1" IS NOW';
310 PRINT CPOS(4,12);"IN MAIN MEMORY"; \ WAIT 1000
320 GOTO 1030
330 !
1000 !******* IEEE BUS CHECK LIST
1010 !
1020 RESUME 1030
1030 PRINT CH$
1040 PRINT CPOS(2,3);"1. VERIFY IEEE CABLE IS CONNECTED"
1050 PRINT CPOS(4,3);"2. VERIFY PLOTTER ADDRESS IS 5 (00101)"
1060 PRINT CPOS(6,3);"3. VERIFY PLOTTER LINE SWITCH IS ON"
1070 PRINT CPOS(8,3);"4. TOUCH SCREEN WHEN READY";
1080 GOSUB 24020
1090 PRINT CH$;CPOS(4,6);"CONTROLLER INITIALIZING PLOTTER"
1100 ON ERROR GOTO 1020
1110 INIT PORT 0 \ CLEAR @ PL% ! INITIALIZE BUS AND PLOTTER
1120 PRINT @ PL%, " ;: P1 H 0 A "
1130 TIMEOUT 0
1140 OFF ERROR
2500 !******** OPEN VIRTUAL ARRAYS
2510 !
2520 CLOSE 1,2
2530 OPEN "DRVSET.VRT" AS NEW DIM FILE 1 SIZE 1 ! DELETE "NEW" FOR OLD DATA
2540 DIM #1, LB$(2%)=64%, NM$(2%), SF(1%), AB(1%), AE(1%) ! SET UP FOR PLOT
2550 OPEN "ARRAY1.VRT" AS NEW DIM FILE 2 ! DELETE "NEW" FOR OLD DATA
2560 DIM #2, XY(10%,1%) ! DATA TO BE PLOTTED
2570 !
```

```
4000 !********* TEST PARAMETERS
4010 !
4020 LB$(0%)="INDEPENDENT VARIABLE" ! TITLE OF X-AXIS
4030 LB$(1%)="DEPENDENT VARIABLE"   ! TITLE OF Y-AXIS
4040 LB$(2%)="Y=(1/X)*5^X" ! TITLE OF PLOT
4050 NM$(0%)="ARRAY1.VRT"  ! NAME OF DATA FILE
4060 NM$(1%)="USERS1.BAL"  ! NAME OF CALLING PROGRAM
4070 NM$(2%)="0,11,10"     ! or NM$="0,11,10,0,4,2"
4080 ! BREAKDOWN: NM$(2%)="PRINT FLAG,NO.OF POINTS,COORDINATE ARRAY SIZE,
4085 !                    LINE NO.,DATA SYMBOL NO.,PEN NO."
4090 ! 1. PRINT FLAG:  THIS NUMBER IS A ZERO OR A ONE.  USE
4100 !    0 WHEN AXES AND TITLES ARE TO BE PLOTTED.  USE 1
4110 !    WHEN THESE ITEMS ARE NOT TO BE PLOTTED.
4120 ! 2. NO. OF POINTS:  YOU HAVE THE OPTION OF PLOTTING
4130 !    ANY CONTIGUOUS GROUP OF COORDINATE POINTS STARTING
4140 !    WITH SUBSCRIPT 0 AND ENDING WITH SUBSCRIPT N-1 WHERE
4150 !    N=NO. OF POINTS.
4160 ! 3. COORDINATE ARRAY SIZE:  THIS IS THE SIZE DIMENSION
4170 !    USED IN THE ARRAY DIM STATEMENT (SEE LINE 1060).
4180 !
4182 ! 4. OPTIONAL LINE STYLE (select from 0 through 9)
4184 !
4185 ! 5. OPTIONAL POINT SYMBOL (select from 0 through 5)
4186 !
4188 ! 6. OPTIONAL PEN NO. (select from 0 thru 6 where 0 restables current pen)
4189 !
4190 PRINT CPOS(4,3);"TOUCH SCREEN TO GENERATE TEST DATA";
4200 GOSUB 24020
4210 !
4220 !********* SIMULATE USER DATA
4230 !
4240 PRINT CH$;CPOS(4,8);"TEST DATA BEING GENERATED";
4250 FOR I%=0 TO 10%
4260  X=I%+.01
4270  XY(I%,0%)=X           ! X COORDINATE
4280  XY(I%,1%)=(1/X)*5^X   ! Y COORDINATE
4290 NEXT I%
4300 !
4310 CLOSE 1,2
4320 !
5000 !********* PAPER AND PEN CHECK
5010 !
5020 PRINT CH$,DS$ \ PRINT;
5030 PRINT "   1. INSERT PLOTTING PAPER"
5040 PRINT "   2. VERIFY PAPER CLAMP IS DOWN"
5050 PRINT "   3. INSERT PEN(S)"
5060 PRINT "   4. VERIFY PLOTTER IS IN REMOTE MODE"
5070 PRINT
5080 PRINT "   TOUCH SCREEN WHEN READY TO PLOT";
5090 GOSUB 24020 ! WAIT FOR TOUCH
5100 !
6000 !********* GET STATUS
6010 !
6020 S%=SPL(PL%) ! SERIAL POLE
6030 IF S% AND 16% GOTO 8720  ! IS PLOTTER IN MANUAL?
6050 PRINT BP$;CH$;"STABLE PEN, PRESS RESET, REMOTE"
6060 WAIT 2000 \ GOTO 6020
6070 !
8700 !********* CALL PLOTTER DRIVER
8710 !
8720 RUN "PLTDRV"
8730 END
24000 !******** TOUCH SENSE WAIT LOOP
24010 !
24020 PRINT DK$;
24030 I%=KEY
24040 I%=KEY \ IF I%=0% GOTO 24040
24050 PRINT BP$
24060 PRINT EK$;
24070 RETURN
24080 !
26000 !********** INTERUPT ROUTINE
26010 !
26020 CLOSE 1,2
26025 PRINT EK$;
26040 END
```

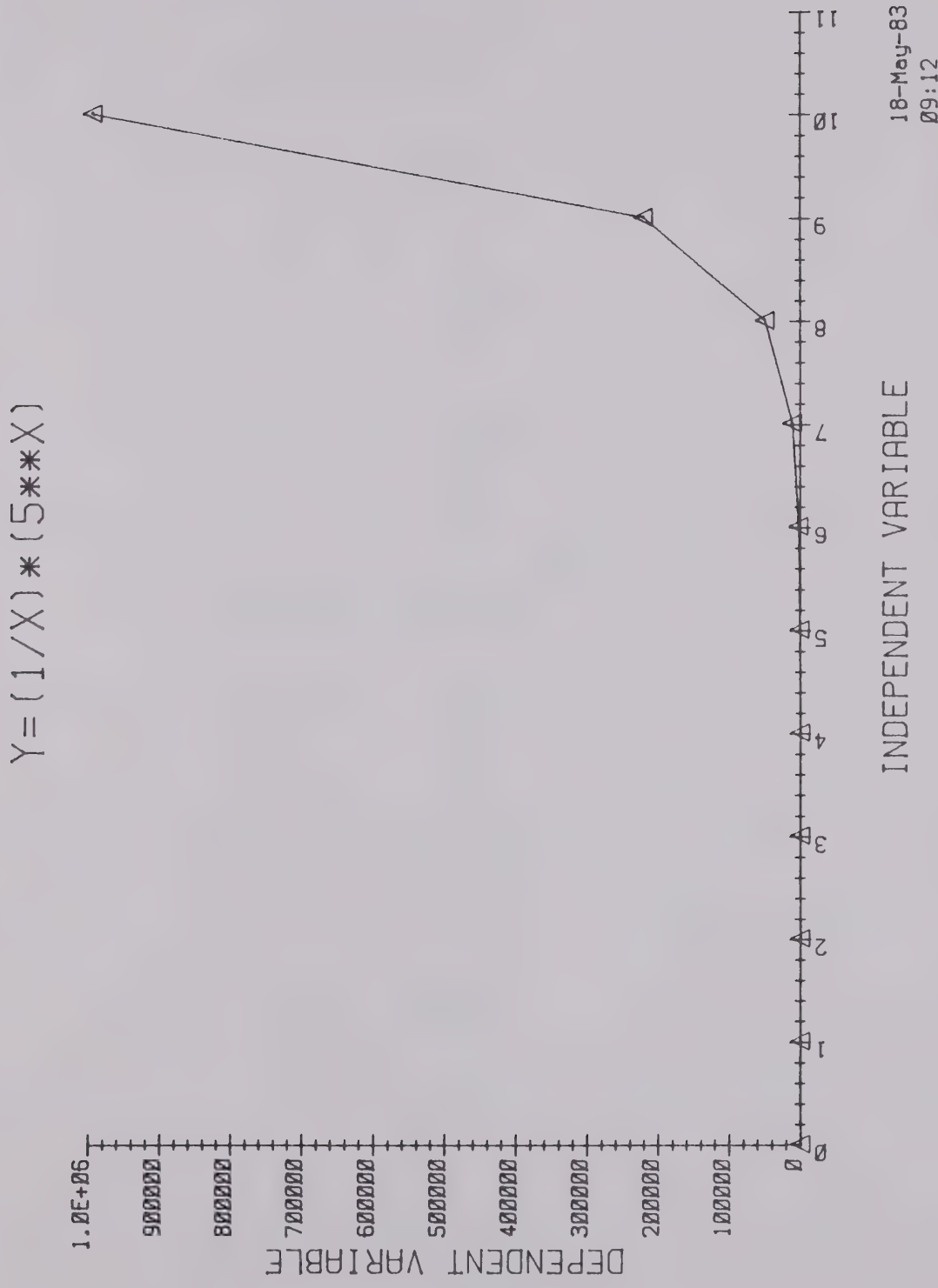



Figure 3-2. Plotter Driver (PLTDRV) Plot of $Y = (1/X)*5^X$

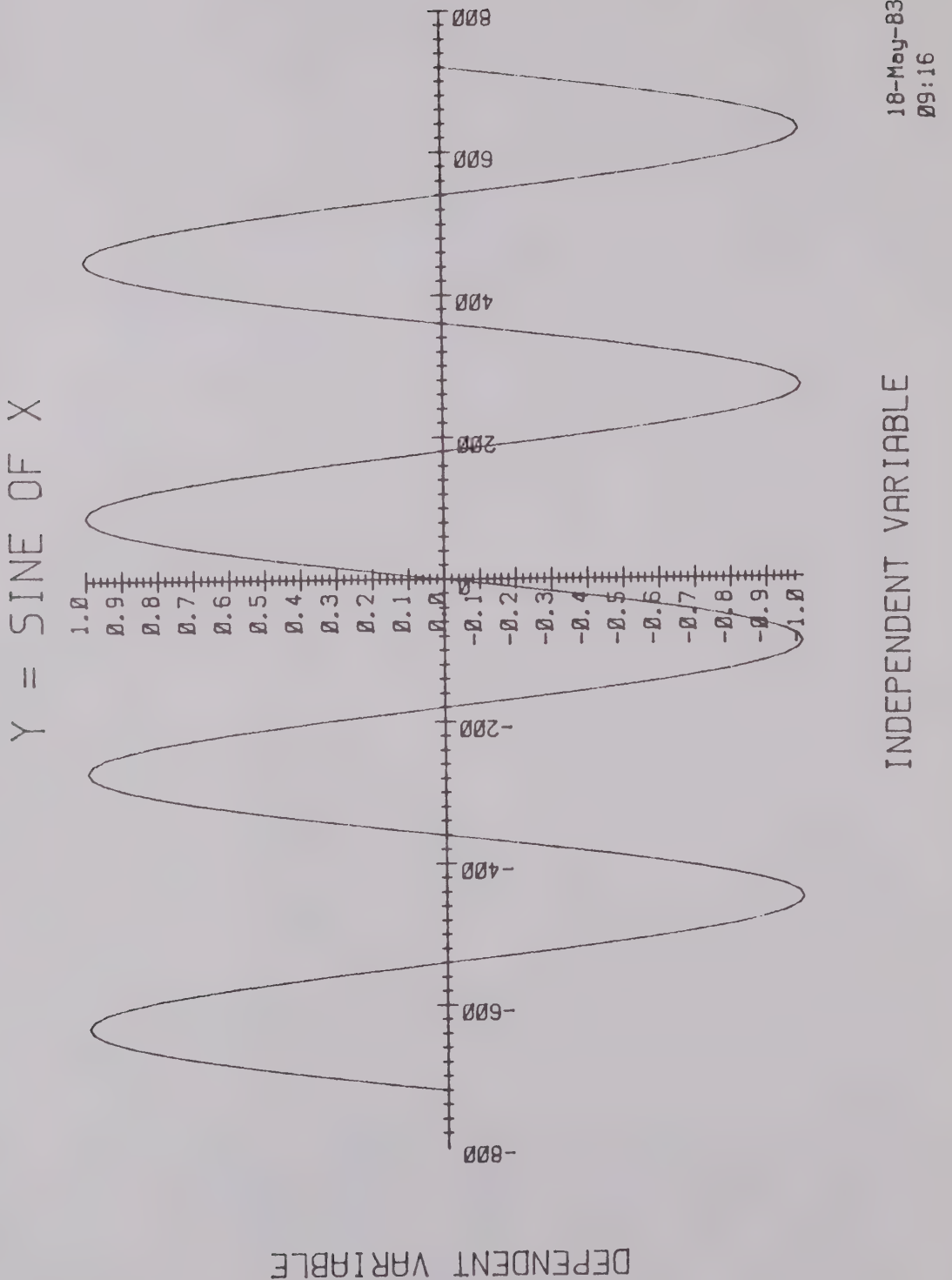



Figure 3-3. Plotter Driver (PLTDRV) Plot of Y = Sine of X

## 3-22. PLTDRV PROGRAM MODULE EXPLANATIONS

3-23. Since this program is intended to be called by the user it is likely that the program might need to be customized to fit a particular application. The following paragraphs describe the main program modules in order to simplify that task. PLTDRV is made up of six different modules. In The following paragraphs each module is briefly described to help the user understand the code which will simplify program modification.

## 3-24. RECOVER PASSED INFORMATION

3-25. The Recover Passed Information module operates on NM$(0..2) which was passed to PLTDRV by the user's program.

1. NM$(0) and NM$(1) simply contain file names.

2. NM$(2) contains three items and can easily contain more items to pass over from the user's program.

The FOR/NEXT loop looks for the comma positions and stores them in the CP%(0..1) array. Knowing where the commas are allows the routine to separate out the numbers. The general equation for finding the first piece of data is (PD%) is as follows:

$$n_0 = \text{VAL(LEFT(NM\$(2\%), CP\%(0)-1\%))}$$

The general equation for finding the $n_f$ or final piece of data is (where NM$="$n_0$, $n_1$, $n_2$,..., $n_i$,...$n_f$") is as follows:

$$n_f = \text{VAL (RIGHT(NM\$(2\%), CP\%(f\%) + 1\%))}$$

The general equation for finding the $n_i$ piece of data which is located some where between the first and last piece of data is as follows:

$$n_i = \text{VAL(MID(NM\$(2\%), CP\%(i-1)+1\%, CP\%(i)-1\%))}$$

Remember to DIM CP% (f-1), and VAL should not be used if string parameters are being recovered.

## 3-26. DETERMINE MAX AND MIN VALUES OF DATA

3-27. The Determine Max and Min Values of Data module compares data to determine the range of the data as a preliminary step to assigning meaningful axes limits.

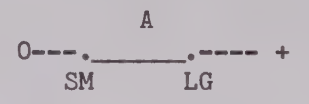
## 3-28. PLOT DATA

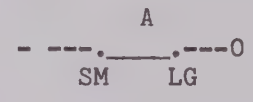
3-29. The Plot Data module assigns the line style and point symbol, then does a FOR/NEXT loop to plot the locus of data points.

## 3-30. CALCULATE AXIS LIMITS AND MAJOR AND MINOR TICS

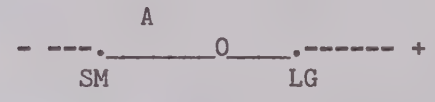
3-31. The Calculate Axis Limits And Major And Minor Tics module uses the following method to determine tic length:

Axis possibilities:

1)



2)



3)

4)



Where LT(I%)=10^(INT(LOG(A)) is the first approximation of the major tic length.

If A/LT doesn't yield at least 6 tic marks within A then LT is divided by 2 or 5 or 10 in order to get 6 or more major tics, when 10<A <100.

Four major tics are sought in lieu of 6. Note that since LT starts out as a power of 10 and is divided (if necessary) by 2 or 5 or 10, LT will always be one of the following three values (which are good choices for tic values): 1.0 x 10^n, 5.0 x 10^n, and 2.0 x 10^n.

On the other hand, if the above calculations cause more than 10 tics (13 tics if 0 is included, i.e., axis possibilities 3 and 4), then LT is multiplied by 2 unless LT is of the form c., in which case LT would be of the form 4.0x10^n, which is unwieldly. If the number of tics is still greater than 10, then LT is multiplied by 5, in which case LT is of the form 2.5x10^n or one of the previous forms.

### 3-32. Pick Axis Limits

3-33. The axis limits are picked so that a whole number of major tics creates an axis whose limit is $\leq$ SM and $\geq$ LG.

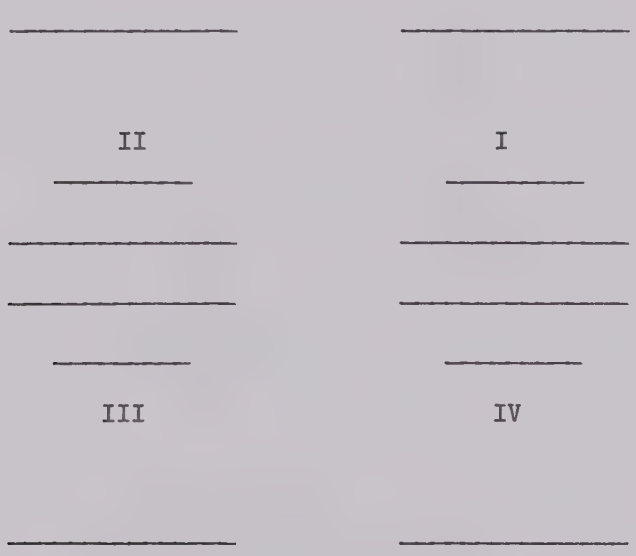
Example:

3-34. Pick Minor Tic Mark Length

3-35. The major tic mark is divided by 10 for a 1st approximation. If there are more than 5 major tic marks then the number of minor tic marks is cut in half, unless the minor tic is of the form $2.0 \times 10^n$ (avoids $4.0 \times 10^n$).

3-36. ASSIGN AXES INTERSECTION COORDINATES

3-37. If zero is within the range of X data, or starts or ends the range of X data, this routine makes the Y axis pass through X=0. The same thing happens to the X axis if 0 is in the range of Y data. Otherwise the axes intersect at the data limits according to quadrants as follows:




3-38. FIND NO. OF DECIMAL PLACES TO BE USED IN TIC LABELS

3-39. This routine looks at the significant digits to the right of the decimal point, in the major tic length and stores this value in TD%.

# Section 4
# Customized X-Y Plot Programs (XYPLOT and XYPLT2)

## 4-1. INTRODUCTION

4-2. The information in this section describes the Customized X-Y Plot Programs, XYPLOT and XYPLT2. The programs XYPLOT and XYPLT2 enable the user to customize an X-Y plot. Data for plotting may be input from the disk or from the keyboard. Information keyed in by the user to customize the axes is called "set up data" and is automatically saved by the program in virtual arrays; this information will survive a CTRL C interruption. If the range of data to be plotted is unknown, the user should plot this data using the Plotter Driver (PLTDRV Program) prior to attempting a customized plot.

4-3. Multiple sets of points, with a variety of line types and symbols, may be plotted on the same graph. A correction routine is included to alter the plotter set up data. Graphs are identified with title, axes titles and date. Set up data is checked by the program for appropriateness. Plotting cannot begin until set up data is reasonable.

4-4. If previously stored data is to be plotted it is important that the data files are structured properly. See the section on structuring data files before this type of plot is attemped.

## 4-5. INPUT CONSIDERATIONS

4-6. Observe the following input considerations when using the Customized X-Y Plot Programs:

1. X axis:

    a. The start of the X-axis (Xstart) is always on the left of the plot.

    b. The end of the X-axis (Xend) is always on the right of the plot.

    c. Xstart < Xend.

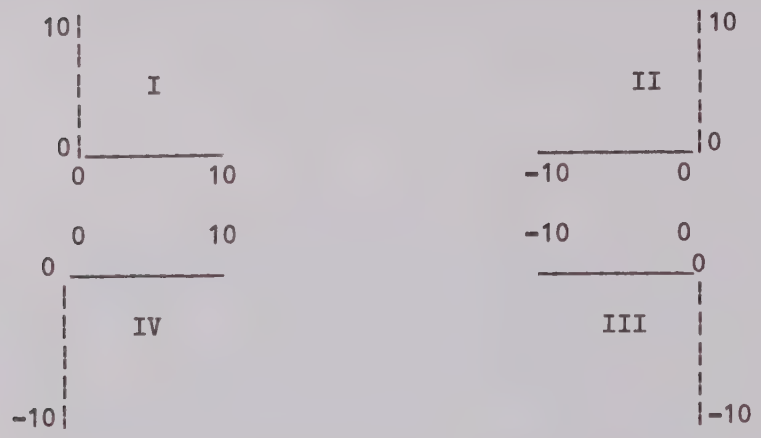
2. Y axis:

    a. The start of the Y-axis (Ystart) is always near the bottom of the plot.

b. The end of the Y-axis (Yend) is always near the top of the plot.

c. Ystart < Yend.

3. The following plots are examples of these input considerations:




3. There must always be an even number of major tic lengths within an axis; there must always be an even number of minor tic lengths within a major tic length. Minor Tic Length ≤ Major Tic Length

CORRECT

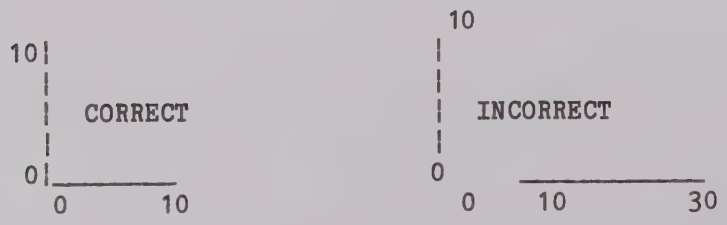
minor tic length = 25

INCORRECT

minor tic length = 20

4. The X-axis and Y-axis must intersect.

Examples:




5. Since log (0) is undefined, 0 cannot be a valid log axis starting or ending point, nor can it be included on a log axis.

6. Tic lengths cannot be interactively entered on the log axis. Tics are assigned just like on standard log paper.

7. Major and Minor Tic lengths on the linear axis cannot be zero. Minor tic lengths can be omitted by assigning them the same length as the major tic length.

8. Tic lengths are always positive numbers.

9. Tic decimals (number of significant digits to the right of the decimal point in the tic labels) cannot be greater than 15 and the number must be positive.

   Examples:

| CORRECT | INCORRECT |
|---|---|
| 0 or 3 or 14 | -1 or 16 or 20 |

4-7. All of the proceding conditions are checked by the program, and, if these conditions are not met, the user must change the indicated inputs before progressing to the actual plot.

4-8. USER INSTRUCTIONS

4-9. After the program has been selected from the MENU, the following messages are displayed in the order presented:

---

XYPLOT PROGRAM NOW LOADING

---

---

X-Y GRAPH PLOTTER PROGRAM
IS NOW IN MAIN MEMORY

---

---

1. VERIFY IEEE CABLE IS CONNECTED
2. VERIFY PLOTTER ADDRESS IS 5(00101)
3. VERIFY PLOTTER LINE SWITCH IS ON
4. TOUCH SCREEN WHEN READY

---

4-10. Complete the following instructions to use the Customized X-Y Plot Program(s):

1. Verify the displayed items 1 through 3 listed in paragraph 4-9. Refer to Section 2 for need help in verifying these items.
2. Touch the screen.

   a. The Controller beeps.

b. If no IEEE Bus error is displayed, go to step 3 of this procedure.

c. If an IEEE Bus error is encountered, the following display appears for one second:

---

IEEE 488
ERROR ENCOUNTERED

---

d. The IEEE-488 Bus Error Handler is described in Appendix A.

3. The following display appears. Only the first 12 characters of each title are displayed.

---

STORAGE DIRECTORY

| | | | | |
|---|---|---|---|---|
| <PLOT TITLE> | 0 | <AVAILABLE> | 5 | |
| <AVAILABLE> | 1 | <AVAILABLE> | 6 | |
| <AVAILABLE> | 2 | <AVAILABLE> | 7 | |
| <AVAILABLE> | 3 | <AVAILABLE> | 8 | Touched No. |
| <AVAILABLE> | 4 | <AVAILABLE> | 9 | appears here |
| | | [KILL] | [LOAD] | |

TOUCH STORAGE FILE NO., THEN TOUCH

---

a. Touch the number next to the title of the graph for the file where you have chosen to store the set up data. (File names used by the program are "GRAPH0 .XYC" through "GRAPH9.XYC"). If a wrong number is accidently touched, simply touch the correct number. The following display appears:

---

PGM
WILL
LOAD
[<No.Touched>]

---

b. If current data needs to be preserved or a plot is desired, proceed to step c. If you need to make this file "AVAILABLE", complete the following steps. (Delete from directory and start with zeroed variables).

1) Touch KILL.

2) Go back to Step 3a.

c. If current data is to be used or altered, touch LOAD and go to Step 4.

d. If this is an available file, go to Step 5.

4. The following display appears to allow the user to set up data:

---

DATA CHOICE

| PLOT PREVIOUS AXES & TITLES | MAKE NEW AXES & TITLES |
|---|---|

TOUCH APPROPRIATE BLOCK

---

a. If you need to plot previously entered set up data, touch PLOT PREVIOUS AXES & TITLES and go to Step 21.

b. If you need to enter new set up data, touch MAKE NEW AXES & TITLES.

5. The following display appears:

---

CURRENT GRAPH NO.: <Current No.>
ENTER GRAPH NO. ? ____
PRESS <CR>

---

a. If the current number is correct, complete the following steps:

   1) Make no entry.

   2) Press RETURN.

b. If the current number is not correct, complete the following steps:

   1) Enter the new graph number via the keyboard.

   2) Press RETURN.

6. The following display appears:

```
CURRENT TITLE NO 1:  <Graph Title 1>
ENTER    ? ____
PRESS <CR>
```

a. If the current title is correct, complete the following steps:

   1) Make no entry.

   2) Press RETURN.

b. If the current title is not correct, complete the following steps:

   1) Enter the new title via the keyboard.

   2) Press RETURN.

7. The following display appears:

```
CURRENT TITLE NO 2:  <Graph Title 2>
ENTER    ? ____
PRESS <CR>
```

a. If the current title is correct, complete the following steps:

   1) Make no entry.

   2) Press RETURN.

b. If the current title is not correct, complete the following steps:

   1) Enter the new title via the keyboard.

   2) Press RETURN.

8. The following display appears:

```
X AXIS TITLE:  <title>
 ENTER   ? ____
 PRESS <CR>
```

a. If the current title is correct, complete the following steps:

   1) Make no entry.

   2) Press RETURN.

b. If the current title is not correct, complete the following steps:

   1) Enter new title.

   2) Press RETURN.

9. The following display appears:

```
                SELECT SCALING FOR X AXIS

   ____________      ____________
  |            |    |            |
  | LOGARITHMIC|    |   LINEAR   |
  |____________|    |____________|

                TOUCH APPROPRIATE BLOCK
```

a. "*" appears below the current scaling.

b. Touch the area for the type of scaling desired.

c. If you touch LINEAR, go to Step 12.

10. The following display appears:

---

X VALUES

X AXIS STARTS AT <Power Of 10>
TYPE ENTRY ? ____

PRESS <CR>

---

Where:

Appropriate entries are .001, .01, .1, 1, 10, 100, 1000, etc.

Inappropriate entries are .02, .2, 20, 200, etc. and negative numbers.

a. If the current start is correct, complete the following steps:

1) Make no entry.

2) Press RETURN.

b. If the current start is not correct, complete the following steps:

1) Enter the new start.

2) Press RETURN.

11. The following display appears:

---

X VALUES

X AXIS ENDS AT <Power Of 10>
TYPE ENTRY ? ____

PRESS <CR>

---

NOTE

See Step 10 for appropriate examples.

a. If the current end is correct, complete the following steps:

1) Make no entry.

2) Press RETURN and go to part c of this step.

b. If the current end is not correct, complete the following steps:

1) Enter the end power.

2) Press RETURN and go to part c of this step.

c. Go to Step 18.

12. The following display appears for linear entries:

```
X VALUES

X AXIS STARTS AT :  <start>
TYPE ENTRY  ? ____
PRESS <CR>
```

a. If the current starting number is correct, complete the following steps:

1) Make no entry.

2) Press RETURN.

b. If the current starting number is not correct, complete the following steps:

1) Enter the new number.

2) Press RETURN.

13. The following display appears:

```
X VALUES

X AXIS ENDS AT:  <end>
TYPE ENTRY  ? ____
PRESS <CR>
```

a. If the current ending number is correct, complete the following steps:

1) Make no entry.

2) Press RETURN.

b. If the current ending number is not correct, complete the following steps:

1) Enter the new number.

2) Press RETURN.

14. The following display appears:

---

X VALUES

Y AXIS INTERSECTS AT <X-value>
TYPE ENTRY ? ____

PRESS <CR>

---

a. If the current X-coordinate is correct, complete the following steps:

1) Make no entry.

2) Press RETURN.

b. If the current X-coordinate is not correct, complete the following steps:

1) Enter the new X-coordinate.

2) Press RETURN.

15. The following display appears:

---

X VALUES

X AXIS MAJOR TIC LENGTH IS: <length>
TYPE ENTRY ? ____
PRESS <CR>

---

a. If the current length is correct, complete the following steps:

1) Make no entry.

2) Press RETURN.

b. If the current length is not correct, complete the following steps:

1) Enter the new length.

2) Press RETURN.

16. The following display appears:

---

X VALUES

X AXIS MINOR TIC LENGTH IS: <length>
TYPE ENTRY ? ____
PRESS <CR>

---

a. If the current length is correct, complete the following steps:

1) Make no entry.

2) Press RETURN.

b. If the current length is not correct, complete the following steps:

1) Enter the new length.

2) Press RETURN.

NOTE

If minor tic marks are not used, enter the major tic length.

17. The following display appears:

---

X VALUES

X AXIS TIC DECIMAL PLACES ARE <No.>
TYPE ENTRY ? ____
PRESS <CR>

---

a. If the current number of significant digits needed to the right of the decimal for the tic labels is correct, complete the following steps:

1) Make no entry.

2) Press RETURN.

b. If the current number is not correct, complete the following steps:

   1) Enter the correct number. For example, if the tics go from .0015 to .015, for a requirement of 4 places, then the number must be 4.

   2) Press RETURN.

18. Repeat Steps 8 through 17 for the Y-axis.

19. The following display appears:

---

MARKER SYMBOLS AVAILABLE ARE:

| | | | |
|---|---|---|---|
| + | (0) | triangle | (4) |
| X | (1) | hourglass | (5) |
| square | (2) | none | (6) |
| octagon | (3) | | |

[ EXIT ]

TOUCH LINE NO., THEN TOUCH ^

---

a. Touch the number for your choice of symbol. If you touch the wrong number, touch the correct number. The number chosen appears on the right side of the display as follows:

---

MARKER
NO.
IS
[<No.>]

---

b. Touch [EXIT].

20. The following display appears:

```
                    LINES AVAILABLE ARE:
        _________(0)      ___ ___ (5)
        .........(1)      ____ ____(6)
         .. .. ..(2)      ___ _ ___(7)
        .-.-.-.-.(3)      ___ __ ___(8)
        _ _ _ _ _(4)      ___ _ ___(9)

                                          [EXIT]
              TOUCH LINE NO., THEN TOUCH    *
```

a. Touch the number for your choice of line. If you touch the wrong number, touch the correct number. The number chosen appears on the right side of the display as follows:

```
                                          LINE
                                          NO.
                                          IS
                                          [<No.>]
```

b. Touch [EXIT].

21. The following display appears:

```
SET UP DATA FOR:    (1)  <GRAPH TITLE 1>   (2) GRAPH NO. < >
                         <GRAPH TITLE 1>

            X-AXIS                          Y-AXIS

TITLE     : (3) <   >                 (11)  <   >
START     : (4) <   >                 (12)  <   >
END       : (5) <   >                 (13)  <   >
INTERSECT : (6) <   >                 (14)  <   >
MAJOR TIC : (7) <   >                 (15)  <   >
MINOR TIC : (8) <   >                 (16)  <   >
D.PLACES  : (9) <   >                 (17)  <   >
SYMBOL    : (10) <   >                (18)  LINE <   >

IF CORRECTIONS ARE NEEDED ENTER:  ITEM NO.? _____
PRESS <CR> (EXIT=<CR> W/O ENTRY)
```

NOTE

If you need to change the scaling (logarithmic or linear) of an axis, the program must be run from the beginning and the change made at Step 8. "Log powers of 10" is displayed next to axis designators when appropriate.

a. If there are no items to be changed, complete the following steps:

   1) Make no entry.

   2) Press RETURN.

   3) Go to Step 23.

b. If there is an item to be changed, complete the following steps:

   1) Enter the item number.

   2) Press RETURN.

22. The approiate display appears to allow you to change or correct the entry in the set up data.

    a. Make corrected entry.

    b. Press RETURN or touch EXIT, as required.

    c. Go to Step 21.

23. When the following display appears, complete the following steps:

---

```
1. Verify Axes Box: Touch LL & UR (below)
2. Touch [CONTINUE] if OK, otherwise..
3. For New Values Touch [MOVE PEN] then
     a. Position Pen With Arrow Keys
     b. Touch _________ [UPPER RIGHT]
or            | ENTER |
     c. Touch _________ [LOWER LEFT]
     d. Go to step no. 1 (above)
```

---

a. Verify the lower left and upper right coordinates by touching LOWER LEFT and UPPER RIGHT.

b. If these are correct touch [CONTINUE] and go to step no. 24.

c. If the LL or UR needs to be changed touch [MOVE PEN] the following screen will appear:

---

```
    Pen Position:     <x-coord.>,<y-coord.>
TOGGLE   or  TOUCH TO MOVE PEN
 ____    ___   ___   ____   ____
|    |  |   |  |   |  |    |    |
| FAST|  |   |  | v |  | <- |  -> |
|____|  |___|  |___|  |____|  ____|

 SPEED  UP   DOWN   LEFT RIGHT
[ PEN UP ] [ PEN 1 ] [ BELL ] [ EXIT ]
   Remember: Check Paper & Pen
```

---

d. With this keyboard the pen may be positioned and a different pen chosen to plot with.

e. After positioning pen into desired location and selecting the proper pen by touching the appropriate location on the screen, touch EXIT.

f. The "Verify Axes Box" screen above will appear, touch ENTER and either LOWER LEFT or UPPER RIGHT then go to step a. and repeat process.

24. The following display appears:

---

1. INSERT PLOTTING PAPER
2. REMOVE CAP FROM PEN
3. CHECK FOR PROPER PEN INSERTION
4. VERIFY CHART LOAD LIGHT IS OFF

5. TOUCH SCREEN WHEN READY TO PLOT

---

1. Verify items 1 through 4.

2. Touch the screen.

POSSIBLE LOCATIONS OR LOWER LEFT AND UPPER RIGHT

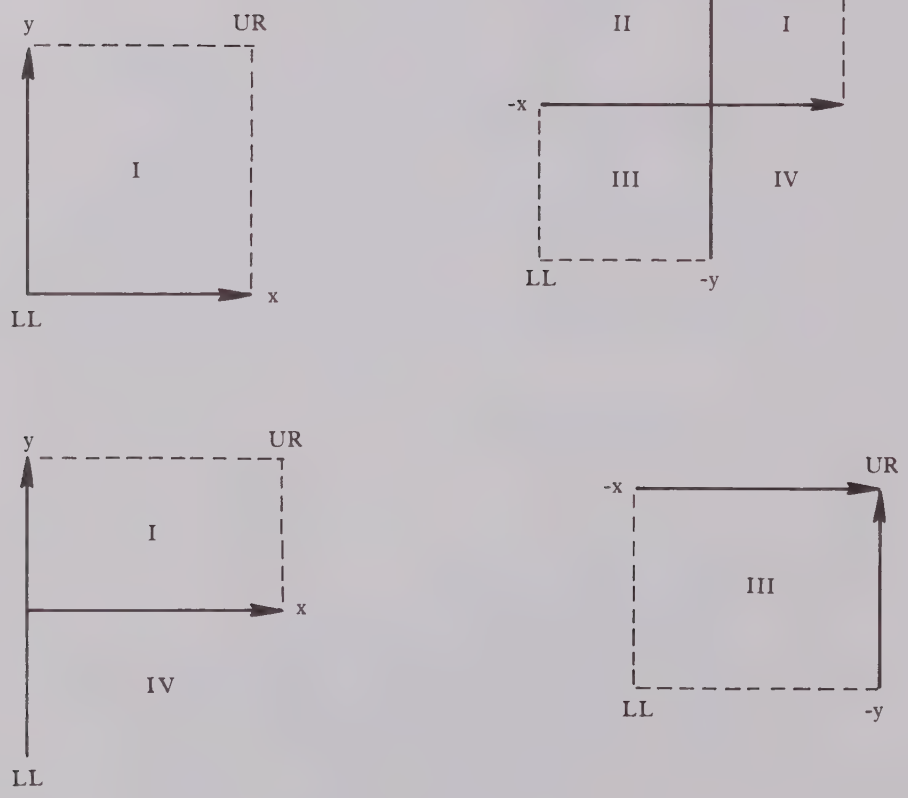



Figure 4-2. Possible Locations of Lower Left and Upper Right

3. The following display appears:

---

CALCULATING SCALE FACTORS

---

25. The following display appears:

---

PLOT AND TIC AXES?

| YES | NO |
|---|---|

TOUCH APPROPRIATE BLOCK

---

a. If the axes have already been plotted, touch NO.

b. If the axes need to be plotted, touch YES. The X and Y axes are plotted and the tics are labeled.

26. The following display appears:

---

SELECT DATA TO PLOT

| KEYBOARD ENTRY | INPUT FROM DISK |
|---|---|

TOUCH APPROPRIATE BLOCK

---

a. If the data you wish to plot is stored on the floppy disk or the Electronic Disk, complete the following steps:

   1) Touch INPUT FROM DISK.

   2) Go to Step 29.

b. If the data you wish to plot will be entered via the keyboard, touch KEYBOARD ENTRY.

27. The following display appears:

---

```
ENTER NUMBER
OF DATA PAIRS TO PLOT  ? ____

PRESS <CR>
```

---

a. Enter the number of X-Y pairs to be plotted.

b. Press RETURN.

28. The following display appears:

---

```
ENTER DATA POINT NO. <subscript>
X,Y  ? ____
PRESS <CR>
```

---

a. Enter <X value>, <Y value>. The comma must be included.

b. Press RETURN.

c. The data pair is plotted.

d. If there are more pairs to enter, go back to Step 28 a.

e. Go to Step 33.

29. The following display appears:

```
DISK PLOTTING DATA
<DEVICE>:<FILE NAME>.<EXT>
ENTER ? ____
PRESS <CR>
```

The following examples illustrate several ways of entering the file named DATA.DVM. See the explanation in Appendix A on structuring data files and see the Fluke Basic Programming Manual (Fluke Part No. 518670) for legal file names.

1) System Device is the Electronic Disk and DATA.DVM is stored on the Floppy Disk:

   Enter MF0:DATA.DVM

2) System Device is the Floppy Disk and DATA.DVM is stored on the Electronic Disk:

   Enter ED0:DATA.DVM

3) System Device and Storage Device are the same:

   Enter DATA.DVM

a) Enter the file name.

b) Press RETURN.

30. The following display appears:

```
ARRAY SIZE: DIM#3, XC (?), YC(?)
SIZE NO. IS SAME FOR BOTH ARRAYS

ENTER SIZE? ____
PRESS <CR>
```

a. Enter the dimension. This is a single entry.

b. Press RETURN.

31. The following display appears:

---

PORTION OF ARRAY TO PLOT
<STARTING SUBSCRIPT>,<ENDING SUBSCRIPT>

ENTER SUBSCRIPTS ? ----

PRESS <CR>

---

a. Enter <starting> subscript, <ending subscript>. For example, if an array has a dim value of 10, enter 0,10 to plot all 11 elements.

b. Press RETURN.

32. The following display appears and data is plotted:

---

PLOTTING DATA

---

33. The following display appears:

---

PLOT IDENTIFIERS?

| YES | NO |
|---|---|

TOUCH APPROPRIATE BLOCK

---

a. If you do not need to plot the identifying labels, complete the following steps:

   1) Touch NO.

   2) Go to Step 38.

b. If you need to plot the identifying labels, touch YES.

34. The following display appears:

```
<LABEL 1>              <LABEL 2>
<LABEL 3>              <LABEL 4>

  ENTER NEW              USE EXISTING
  IDENTIFIERS            IDENTIFIERS

<LABEL 5>              <LABEL 6>

TOUCH APPROPRIATE BLOCK
```

a. If the current identifiers are correct, complete the following steps:

   1) Touch USE EXISTING IDENTIFIERS.

   2) Go to Step 37.

b. If the identifiers need updating, touch ENTER NEW IDENTIFIERS.

35. The following display appears:

```
CURRENT LABEL 1 IS <YOUR CHOICE>

ENTER ? ____
PRESS <CR>
```

a. If the label is correct, complete the following steps:

   1) Make no entry.

   2) Press RETURN.

b. If the label is not correct, complete the following steps:

   1) Enter new label(16 characters maximum).

   2) Press RETURN.

c. go back to part a. until all labels are entered or corrected.

NOTE

If no label is desired entering a single space will cause this label not to be printed.

36. Go to Step 34.

37. The following display appears:

---

PLOTTING IDENTIFYING DATA

---

a. Identifiers are plotted.

b. Plot is finished.

38. The following display appears:

---

PLOT IS FINISHED
SELECT NEXT PROGRAM?

| XYPLOT DIRECTORY | XY DATA SAME PLOT | MENU |
|---|---|---|

TOUCH APPROPRIATE BLOCK

---

a. Touch the appropriate selection.

b. If MENU was touched, proceed to the user instructions for MENU.

c. If XYPLOT DIRECTORY was touched, go to Step 1.

d. If XY DATA SAME PLOT was touched go to Step 22. Touch this block when plotting a family of curves.

## 4-11. STRUCTURING AND RESTRUCTURING DATA FILES

4-12. The Customized X-Y Plot program is structured to handle X-Y disk data that has been dimensioned as two separate virtual arrays. If there are N X-Y data pairs, the dimension statement has been programmed in this manner.

```
DIM #1 XC(N-1), YC(N-1)
```

where XC is the X coordinate and YC is the Y coordinate.

4-13. The names of these two arrays do not have to be XC and YC in the program that generates the X-Y data, but the order of dimensioning must be held to, i.e., X-first, Y-second.

4-14. If your data has been dimensioned and structured differently, a simple program such as the one following can be written to restructure your data:

Given: N Data pairs

```
DIM D(2N-1)
FOR I%=0% to 2N-1% STEP 2%

   D(I%)=X
   D(I%+1%)=Y

NEXT I%
```

Restructuring:

```
OPEN #1 AS NEW DIM FILE 1 SIZE (ABS(INT(-16*N/512)))
DIM #1, XC (N-1), YC (N-1)

 FOR I%=0% TO 2N-1% STEP 2%

  XC (I%/2)=D(I%)
  YC(I%/2)=D(I%+1%)

NEXT I%
```

NOTE

Also see Appendix A.

## 4-15. EXAMPLES

4-16. Figures 4-3 and 4-4 are examples that resulted from using the Custom X-Y Plot program.

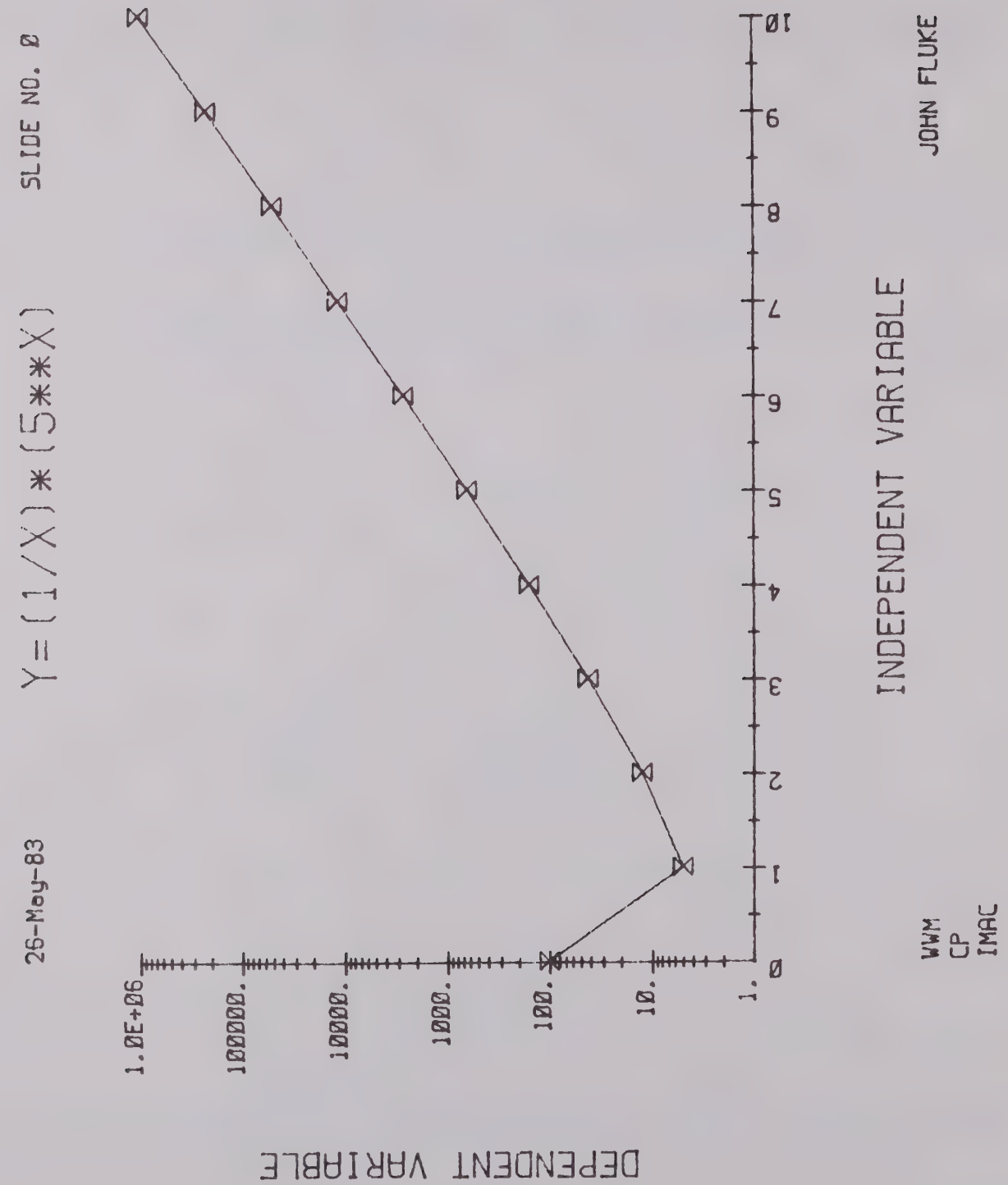



Figure 4-3. Interactive X-YPLOT, Example #1

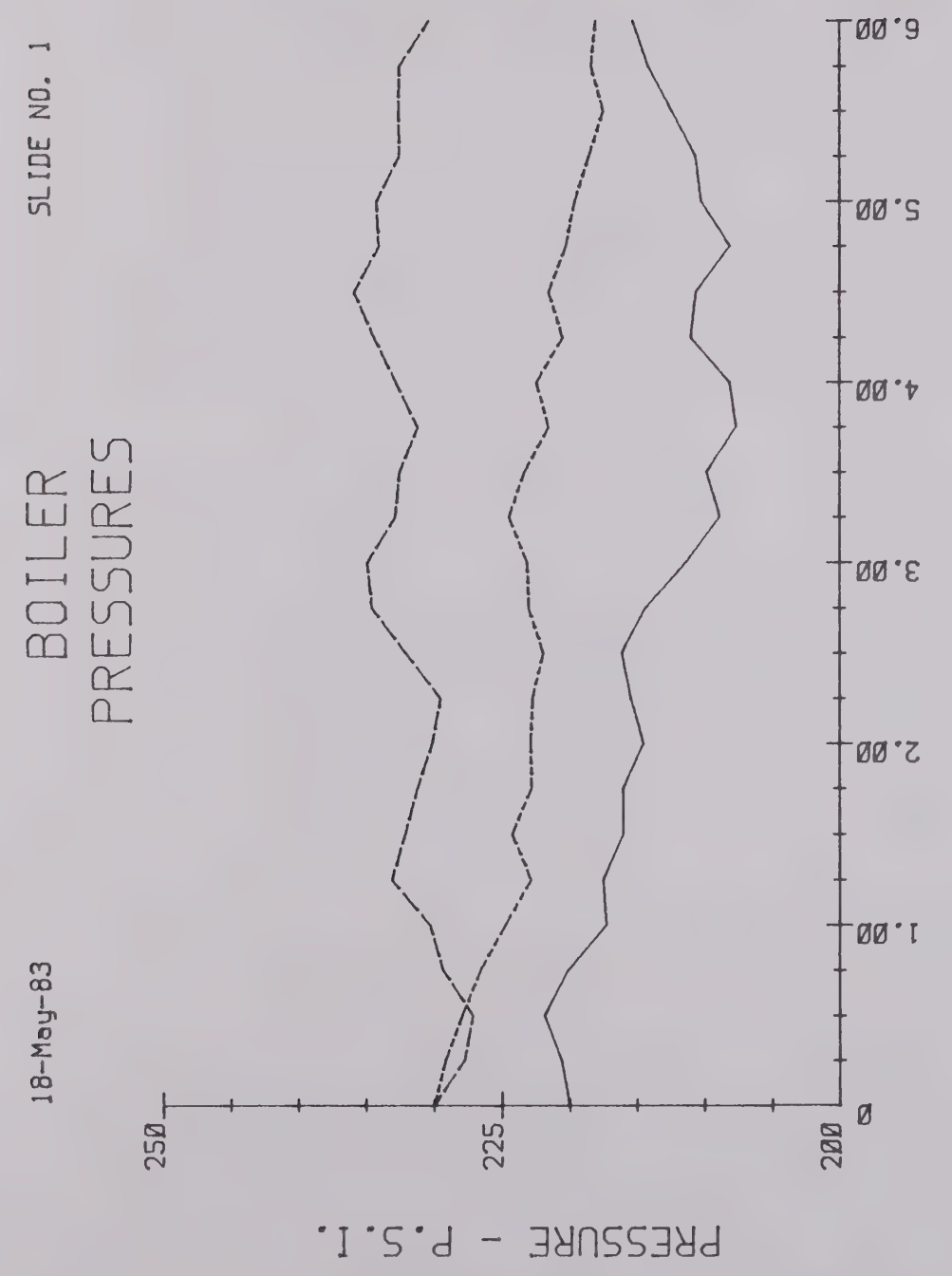



**Figure 4-4. Interactive X-YPLOT, Example #2**

# Section 5
# Pie Chart Plotting Program (PIEPLT)

## 5-1. INTRODUCTION

5-2. The PIEPLT Program plots pie charts with as many as 16 pieces of pie. The chart can be oriented with the 11-inch dimension horizontal or vertical. Different colors and the option of exploding any piece from the entire pie allow important information to be emphasized. Once the data has been entered, the chart can be plotted in either orientation without having to enter the data again. Examples of both orientations are shown later in this section.

5-3. The program has an editing feature that allows the user to make corrections without having to enter all the data again. Data is stored on the disk in virtual arrays and may be replotted after a CTRL/C interrupt.

5-4. Make a pencil plot of the pie chart you want before entering data into the program. Make sure that the pieces add up to 100%. The program will assign the difference between 100% and the sum of the pieces entered, to the last piece in the plot. The plot will have the accuracy of the percentages entered even though the labels are in rounded numbers. The following examples show the effect of rounding entries in a three piece pie chart:

| | | | |
|---|---|---|---|
| Entries: | 33.3333% | Plotted Piece Labels: | 33.3% |
| | 33.3333% | | 33.3% |
| | | | 33.3% |

| | | | |
|---|---|---|---|
| Entries: | 33.3% | Plotted Piece Labels: | 33.3% |
| | 33.3% | | 33.3% |
| | | | 33.4% |

5-5. Orient the large and small pieces to take advantage of the most reasonable direction of labels. For example, (looking at the circle like a clock face) small pieces should be at 3 o'clock and 9 o'clock in the 11-inch vertical orientation in order to contain the label within the pie section. Small sections will not crowd together if they can be alternated with larger sections. The 11-inch vertical orientation is best when the number of pieces is few because titles can be placed inside the pie without crowding. The 11-inch horizontal orientation works best when the number of pieces is is many because titles are placed outside the pie chart where there is more room.

5-6. USER INSTRUCTIONS

NOTE

Erroneous inputs to this program cause the Instrument Controller to beep and to repeat the displayed input request.

5-7. Go to the MENU and select the PIEPLT program then use the following procedure to set up and run the PIEPLT program. After the PIEPLT program has been selected from the MENU, the following messages are displayed in the order shown:

---

PIEPLT PROGRAM NOW LOADING

---

---

PIECHART PLOTTER PROGRAM
IS NOW IN MAIN MEMORY

---

---

1. VERIFY IEEE CABLE IS CONNECTED

2. VERIFY PLOTTER ADDRESS IS 5 (00101)

3. VERIFY PLOTTER LINE SWITCH IS ON

4. TOUCH SCREEN WHEN READY

---

1. Verify the displyed items 1 through 3. Refer to Section 2 for help in verifying these items.

2. Touch the screen. The following happens:

   a. The Controller beeps.

   b. If no IEEE Bus error is encountered, go to Step 3.

   c. If an IEEE Bus error is encountered, the following display will appear for one second. Go to the IEEE error material in Appendix A and then return to Step 3 of this procedure.

IEEE 488
ERROR ENCOUNTERED

3. The following display appears:

```
                STORAGE DIRECTORY
<PLOT TITLE>  0            <Available>  5
<           > 1            <          > 6
<           > 2            <          > 7
<           > 3            <          > 8
<           > 4            <          > 9
                         [KILL]   [LOAD]
TOUCH STORAGE FILE NO., THEN TOUCH ^
```

a. Only the first 12 letters of each title are displayed.

b. Look at the displayed directory and touch the number of the PLOT TITLE where you have chosen to store the chart. File names used by the program can be PIECE0.PIE through PIECE9.PIE.

c. The following display appears:

```
                                        PGM
                                        WILL
                                        LOAD
                                        [NO.>]
```

d. If a wrong number was accidentally touched, touch the correct number. The display in part c of this step will repeat with the correct number.

e. If you want to make this file "AVAILABLE" (delete from disk and start with zeroed variables), complete the following steps:

   1) Touch KILL.

   2) Go to Step 3a.

f. If you want to use this file with the current data preserved, touch LOAD.

g. If this is an available file, go to Step 5.

4. The following display appears:

---

DATA CHOICE

| PLOT PREVIOUS ENTRIES | MAKE NEW ENTRIES |
|---|---|

---

a. If you want to plot previously entered data, touch PLOT PREVIOUS ENTRIES and go to Step 7.

b. If you want to enter new data, touch MAKE NEW ENTRIES.

5. The following display appears:

---

```
CURRENT SLIDE NO.:  <Current No.>
ENTER SLIDE NO.       ? ____
PRESS <CR>
```

---

a. If the current number is correct, complete the following steps:

   1) Make no entry.

   2) Press RETURN.

b. If the current number is not correct, complete the following steps:

   1 Enter the new slide number via the keyboard.

   2) Press RETURN.

6. The following display appears:

```
CURRENT TITLE:   <Current Title>
ENTER         ? ____
PRESS <CR>
```

a. If the current title is correct, complete the following steps:

   1) Make no entry.

   2) Press RETURN.

b. If the current title is incorrect, complete the following steps:

   1) Enter the new title via the keyboard (32 characters, maximum).

   2) Press RETURN.

7. The following display appears:

```
                SELECT CHART ORIENTATION

  ________________          ________________
 |                |        |                |
 | 11" HORIZONTAL |        |  11" VERTICAL  |
 |________________|        |________________|

                TOUCH APPROPRIATE BLOCK
```

a. Figure 5-1 shows the 11-inch horizontal orientation. Figure 5-2 shows the 11-inch vertical orientation.

b. If you want the horizontal orientation with labels outside the circle, touch 11" HORIZONTAL.

c. If you want the horizontal orientation with labels inside the circle, touch 11" VERTICAL.

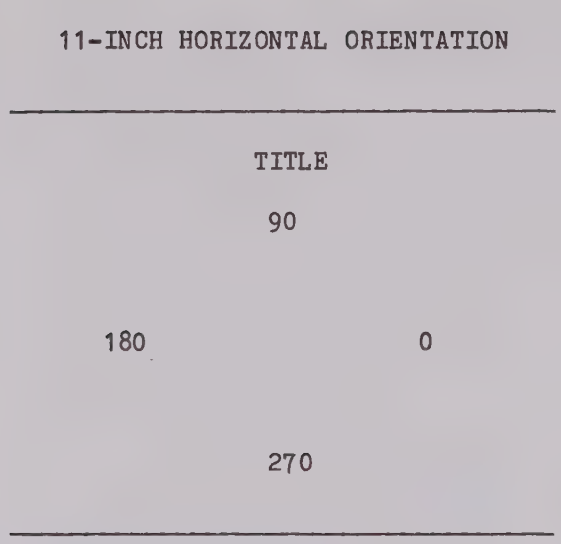



Figure 5-1. 11-inch Horizontal Orientation For PIEPLT

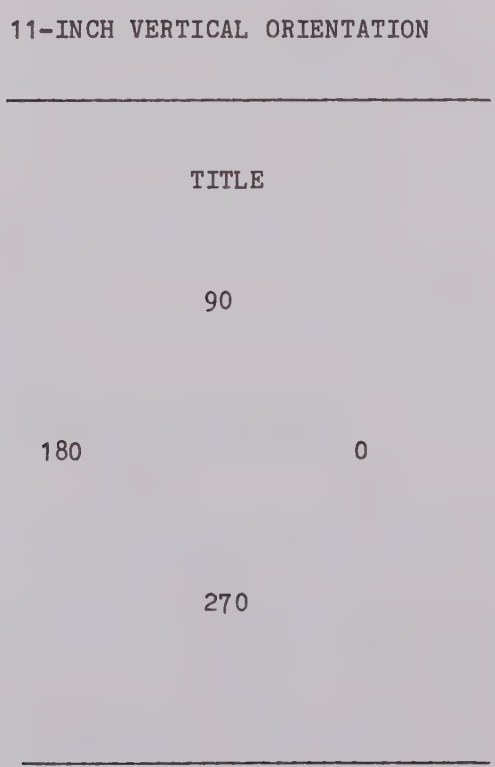



Figure 5-2. 11-inch Vertical Orientation For PIEPLT

8. The following display appears:

---

1. INSERT PLOTTING PAPER
2. REMOVE CAP FROM PEN
3. CHECK FOR PROPER PEN INSERTION
4. VERIFY MANUAL LIGHT IS OFF

5. TOUCH SCREEN WHEN READY TO PLOT

---

a. Verify items 1 through 4 in the display.

b. Touch the screen.

c. If plotting previously entered data go to step 14.

9. The following display appears:

---

CURRENT NUMBER OF PIECES: <Current No.>
ENTER NO. PIECES ? _____
PRESS <CR>

---

a. If the current number is correct, complete the following steps:

   1) Make no entry.

   2) Press RETURN.

b. If the current number is incorrect, complete the following steps:

   1) Enter the new number of pieces (16, maximum) via the keyboard.

   2) Press RETURN.

10. The following display appears:

```
CURRENT STARTING ANGLE:  <Current angle>
ENTER ANGLE (0 TO 360 DEG.)  ?  ____
PRESS <CR>
```

a. The starting angle for each side which is common to the first and last piece of pie. Degree orientation for each paper orientation are shown in Figures 5-1 and 5-2.

b. If the current starting angle is correct, complete the following steps:

   1) Make no entry.

   2) Press RETURN.

b. If the current starting angle is incorrect, complete the following steps:

   1) Enter the new starting angle via the keyboard.

   2) Press RETURN.

11. The following display appears:

```
CURRENT LABEL IS:  <YOUR CHOICE>

Pen No.s 1-6, E=Exploded, U=Unexploded

ENTER  {PenNo.}{E or U}LABEL FOR PIECE <Piece No.>
? ___

Press <CR>
```

a. If the label is correct or does not need to be modified, complete the following steps:

   1) Make no entry.

   2) Press RETURN.

b. If the label is incorrect or needs to be modified, complete the following steps:

1) Enter the new label (16 characters, maximum) via the keyboard. Use the following format:

{Pen No.}{E or U}LABEL

Below are examples of correct labels.

```
1UPERSONAL LEAVE
1ESICKNESS
5EVACATION
```

2) Press RETURN.

12. If this was the last label, go to Step 14. If this was not the last label, got to Step 13.

13. The following display appears:

---

```
THE % FOR <Label> IS:  <Current %>
ENTER %:     ? ____
PRESS <CR>
```

---

a. If the percentage is correct, complete the following steps:

1) Make no entry.

2) Press RETURN.

b. If the percentage is incorrect, complete the following steps:

1) Enter the new percentage via the keyboard.

2) Press RETURN.

14. The following display appears:

---

PLOTTING PIECES

---

The plotter plots the pie piece just entered including the label and the percentage. If this was the last piece, go to step 16.

15. Go to Step 11.

16. The following display appears:

---

<AUTHOR> <DIVISION>
<DEPARTMENT>

| ENTER NEW IDENTIFIERS | USE EXISTING IDENTIFIERS |
|---|---|

<COMPANY>

TOUCH APPROPRIATE BLOCK

---

a. If the current identifiers are correct, complete the following steps:

   1) Touch USE EXISTING IDENTIFIERS

   2) Go to Step 22.

b. If the identifiers need updating, touch ENTER NEW IDENTIFIERS.

17. The following display appears:

---

CURRENT AUTHOR IS: <Author's name or initials>
ENTER ? ____
PRESS <CR>

---

a. If the name or initials entry is correct, complete the following steps:

   1) Make no entry.

   2) Press RETURN.

b. If the name or initials entry is incorrect, complete the following steps:

   1) Enter the new name or initials (32 characters, maximum) via the keyboard.

2) Press RETURN.

18. The following display appears:

---

```
CURRENT DEPT. IS:  <Department name>
ENTER    ? ____
PRESS <CR>
```

---

a. If the department name is correct, complete the following steps:

   1) Make no entry.

   2) Press RETURN.

b. If the department name is incorrect, complete the following steps:

   1) Enter the new department name (32 characters, maximum) via the keyboard.

   2) Press RETURN.

19. The following display appears:

---

```
CURRENT DIVISION IS:  <Division name>
ENTER   ? ____
PRESS <CR>
```

---

a. If the name or initials entry is correct, complete the following steps:

   1) Make no entry.

   2) Press RETURN.

b. If the division name is incorrect, complete the following steps:

   1) Enter the new division name (32 characters, maximum) via the keyboard.

   2) Press RETURN.

26. The following display appears:

---

```
CURRENT COMPANY IS:  <Company name>
ENTER   ? ____
PRESS <CR>
```

---

a. If the company name is correct, complete the following steps:

   1) Make no entry.

   2) Press RETURN.

b. If the company name is incorrect, complete the following steps:

   1) Enter the new company name (32 characters, maximum) via the keyboard.

   2) Press RETURN.

21. Go to Step 16.

22. The following display appears:

---

PLOTTING IDENTIFICATION

---

a. Identifiers are plotted.

b. The plot is finished.

23. The following display appears:

```
PLOT IS FINISHED
SELECT NEXT PROGRAM?

  ANOTHER PIE        MENU

TOUCH APPROPRIATE BLOCK
```

a. Touch the appropriate selection.

b. If MENU is touched, go to Section 2 for instructions.

c. If ANOTHER PIE is touched, go back to step 3 of this procedure.

## 5-8. EXAMPLE PIE PLOTS

5-9. Figures 5-3, 5-4, and 5-5 are example pie plots. Figure 5-3 shows a pie chart of employee absence. Figure 5-4 shows a test pie plot with 11-inch horizontal orientation. Figure 5-5 shows the same test plot with 11-inch vertical orientation.

IMAC

# EMPLOYEE ABSENCE

SLIDE NO. 1



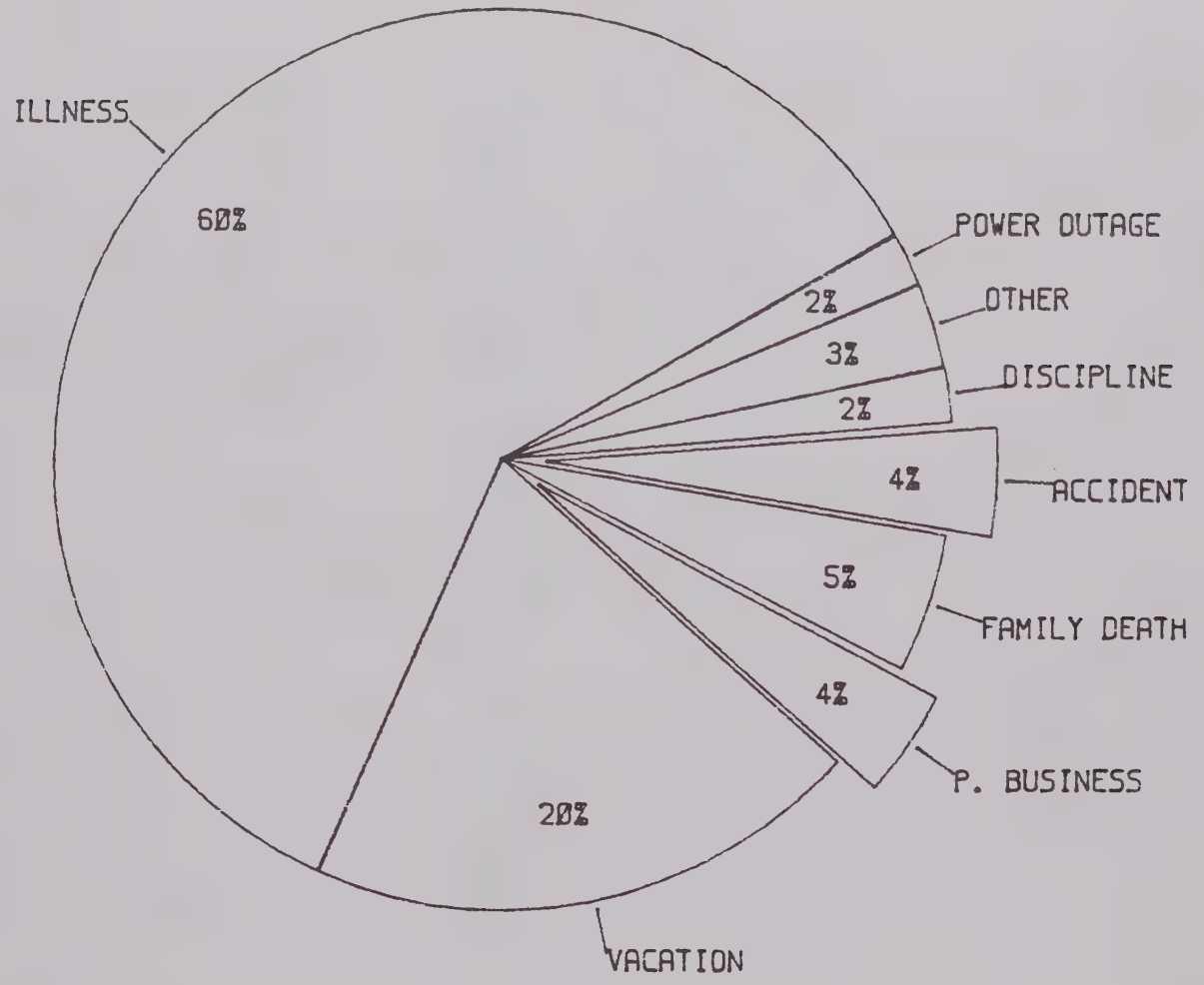



Figure 5-3. Example Pie Plot #1.

WWM
25-May-83

CP
JOHN FLUKE

IMAC

# TEST

SLIDE NO. 1

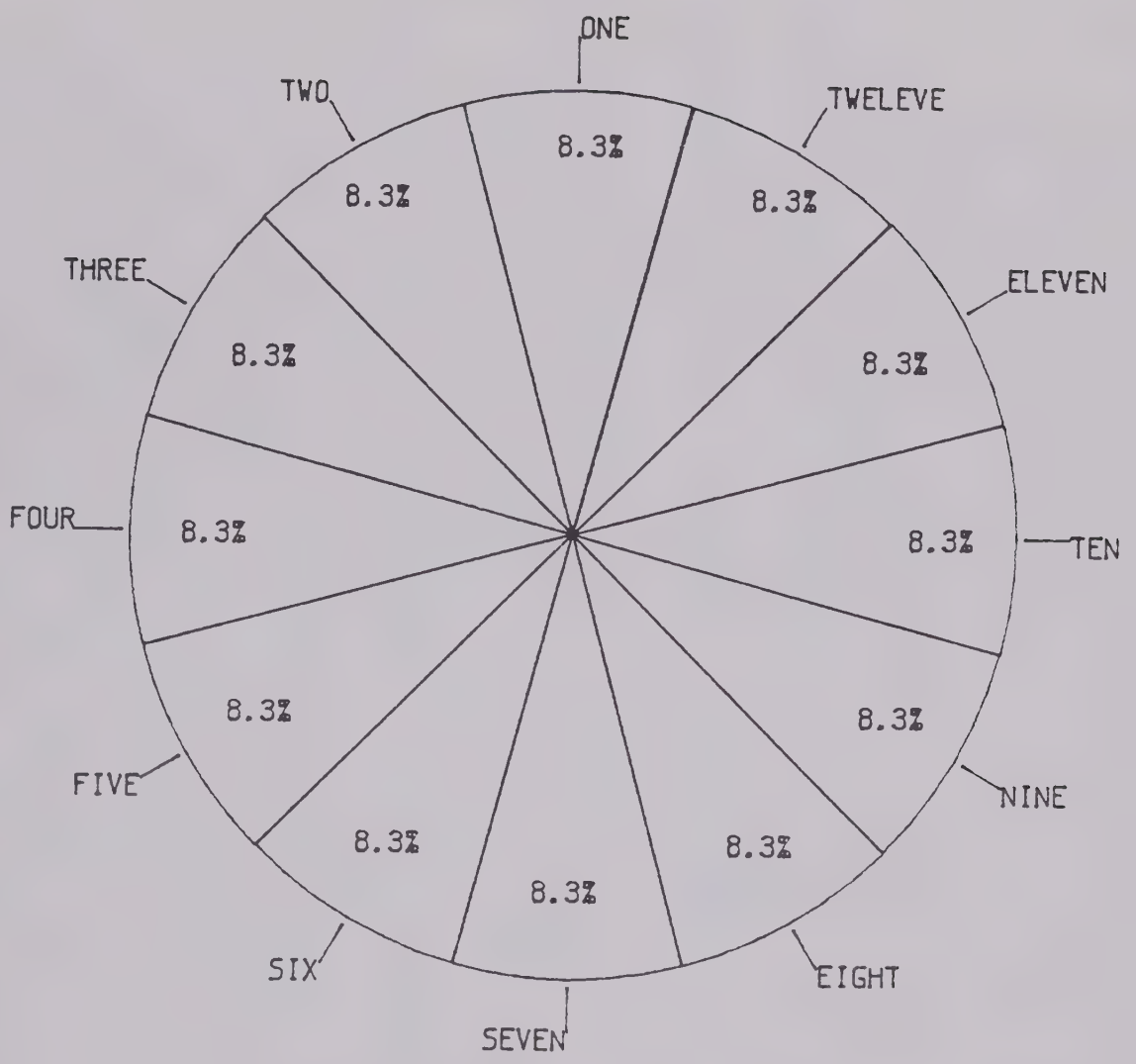



Figure 5-4. Example Pie Plot #2.

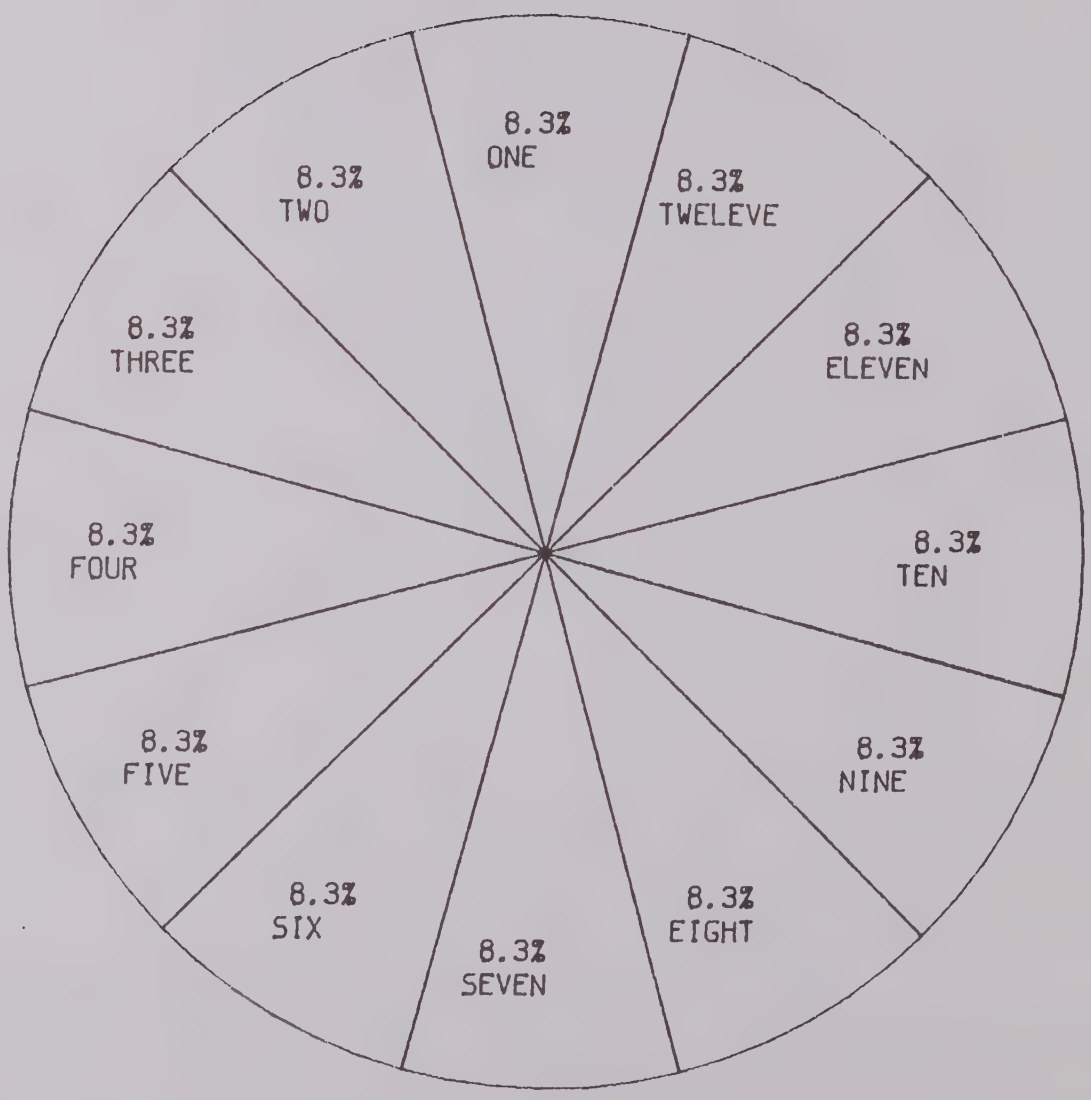
WWM
25-May-83

CP
JOHN FLUKE

1771A

IMAC

SLIDE NO. 1




WWM
25-May-83

CP
JOHN FLUKE

**Figure 5-5. Example Pie Plot #3**

Section 6
Plotting Bar Graphs -- Programs BARPLT and BRPLT2

## 6-1. INTRODUCTION

6-2. The programs BARPLT and BRPLT2 enables the user to plot a bar graph with as many as 16 bars. Additional sets of bars may be plotted on the same graph. Bars may be plain, solid or filled with one of six different cross hatch patterns. The program can place bar labels inside the bars, above the bars or below the bars, plotted either vertically or horizontally.

6-3. The "set up data" for the axes and bars is automatically saved by the program in virtual arrays; this information will survive a CTRL C interrupt.

6-4. The bar graphing program can also be used to plot the bars of a histogram; however, the "Customized X-Y Plot" program must be used to plot the axis and envelope for the histogram. Refer to the section titled "Histogram Plotting".

## 6-5. USER INSTRUCTIONS

6-6. After the program has been selected from the menu, these messages are displayed in this order:

```
BARPLOT PROGRAM NOW LOADING
```

```
BAR GRAPH PLOTTER PROGRAM
IS NOW IN MAIN MEMORY
```

```
1.  VERIFY IEEE CABLE IS CONNECTED
2.  VERIFY PLOTTER ADDRESS IS 5(00101)
3.  VERIFY PLOTTER LINE SWITCH IS ON
4.  TOUCH SCREEN WHEN READY
```

6-7. To use the programs, complete the following procedure:

1. Verify items 1 through 3 in the last display of the last paragraph. Refer to the user instructions for the MENU program if you need help in verifying these items.

2. Touch the screen.

   a. The Controller beeps.

   b. If no IEEE Bus error is displayed, go to step 3.

   c. If an IEEE Bus error is encountered, the following display appears for one second:

```
                    IEEE 488
                ERROR ENCOUNTERED
```

   d. Go to the section on IEEE Errors in Appendix A, then return to Step 3 of this procedure.

3. The following display appears:

```
                    STORAGE DIRECTORY

<PLOT TITLE>     0  <AVAILABLE>     5
<AVAILABLE       1  <AVAILABLE>     6
<AVAILABLE>      2  <AVAILABLE>     7
<AVAILABLE>      3  <AVAILABLE>     8  Touched No.
<AVAILABLE>      4  <AVAILABLE>     9  appears here
                    [KILL]        [LOAD]
TOUCH STORAGE FILE NO., THEN TOUCH
```

   a. Touch the number of the PLOT TITLE where you have chosen to store the set up data. (File names used by the program are "GRAPH0.BAR" through "GRAPH9.BAR"). If a wrong number is accidently touched, touch the correct number to recover. The following appears in the display:

```
                    PGM
                    WILL
                    LOAD
                    [<No.Touched>]
```

b. If you want to make this file "AVAILABLE" (delete from DISK and start with zeroed variables), touch KILL and go to Step 3a.

c. If you want to use this file without zeroing out the variables, touch LOAD and go to Step 4.

d. If this is an available file, go to Step 5.

4. The following display appears:

```
                DATA CHOICE
  ________________    ________________

  PLOT PREVIOUS       MAKE NEW
  ENTRIES             ENTRIES
  ________________    ________________

  TOUCH APPROPRIATE BLOCK
```

a. If you want to plot previously entered set up data, touch PLOT PREVIOUS ENTRIES and go to Step 22.

b. If you want to enter new set up data, touch MAKE NEW ENTRIES.

5. The following display appears:

```
CURRENT GRAPH NO.:  <Current No.>
ENTER GRAPH NO.     ? ____
PRESS <CR>
```

a. If the current number is correct, press RETURN.

b. If the current number is not correct, enter the new graph number via the keyboard and press RETURN.

6. The following display appears:

```
CURRENT TITLE NO. 1:     <Current title 1>
ENTER TITLE
? ____
PRESS <CR>
```

a. If the current title is correct, press RETURN.

b. If the current title is not correct, enter the new title via the keyboard (32 characters, maximum) and press RETURN.

7. The following display appears:

```
CURRENT TITLE NO. 2:     <Current title 2>
ENTER TITLE
? ____
PRESS <CR>
```

a. If the current title is correct, press RETURN.

b. If the current title is not correct, enter the new title via the keyboard (32 characters, maximum) and press RETURN.

8. The following display appears:

```
X AXIS TITLE:  <title>
ENTER TITLE
?  ----
PRESS <CR>
```

a. If the current title is correct, press RETURN.

b. If the current title is not correct, enter the new title via the keyboard and press RETURN.

9. The following display appears:

```
Y AXIS TITLE: <title>
ENTER TITLE
? ____
PRESS <CR>
```

a. If the current title is correct, press RETURN.

b. If the current title is not correct, enter the new title via the keyboard and press RETURN.

10. The following display appears:

```
                        Y VALUES

Y AXIS STARTS AT :  <start>
TYPE ENTRY  ? ____
PRESS <CR>
```

a. If the current starting number is correct, press RETURN.

b. If the current starting number is not correct, enter the new number via the keyboard and press RETURN.

11. The following display appears:

```
                        Y VALUES

Y AXIS ENDS AT:  <end>
TYPE ENTRY  ? ____
PRESS <CR>
```

a. If the current ending number is correct, press RETURN.

b. If the current ending number is not correct, enter the new number via the keyboard and press RETURN.

12. The following display appears:

```
                        Y VALUES

Y AXIS MAJOR TIC IS:  <length>
TYPE ENTRY  ? ____
PRESS <CR>
```

a. If the current length is correct, press RETURN.

b. If the current length is not correct, enter the new length via the keyboard and press RETURN.

13. The following display appears:

```
                        Y VALUES

Y AXIS MINOR TIC IS:  <length>
TYPE ENTRY  ? ____
PRESS <CR>
```

a. If the current length is correct, press RETURN.

b. If the current length is not correct, enter the new length via the keyboard and press RETURN.

14. The following display appears:

```
                        Y VALUES

Y AXIS TIC DECIMAL PLACES ARE <No.>
TYPE ENTRY ? ____
PRESS <CR>
```

a. If the current number of significant digits needed to the right of the decimal for the tic labels is correct, press RETURN.

b. If the current number is not correct, enter the correct number via the keyboard and press RETURN. For example, enter 4<RETURN> to enter the correct number of decimal places for tics from .0015 to .015.

15. The following display appears:

```
CURRENT NUMBER OF BARS:  <No.>
ENTER NO. OF BARS  ? ____
PRESS <CR>
```

a. If the current number of bars is correct, press RETURN.

b. If the current number of bars is not correct, enter the new number of bars via the keyboard and press RETURN.

16. The following display appears:

---

| FILLED BARS | EMPTY BARS |
|---|---|

TOUCH APPROPRIATE BLOCK

---

An asterisk (*) appears at the current choice.

If you want filled bars or bars with hatches, touch FILLED BARS, otherwise touch EMPTY BARS.

17. The following display appears:

---

LABEL POSITION

| INSIDE BARS | ABOVE BARS | BELOW BARS |
|---|---|---|

TOUCH APPROPRIATE BLOCK

---

An asterisk (*) appears at the current choice.

a. If your bars are unfilled and are all relatively long and all bar labels fit inside the bars.

   1) Touch INSIDE BARS.

   2) Go to Step 18.

b. If some of your bars are short and labels would be best placed above the bars.

   1) Touch ABOVE BARS.

   2) Go to Step 18.

c. If you prefer bar labels below the X-Axis touch BELOW BARS.

NOTE

All three label positions can be used by performing three different setups for the same graph.

18. The following display appears:

---

| VERTICAL LABELS | HORIZONTAL LABELS |
|---|---|

TOUCH APPROPRIATE BLOCK

---

An (*) appears at the current choice.

a. If labels are to be oriented as follows, touch VERTICAL LABELS:

1980 ***** rotate clockwise 90° ******

b. If labels are to be oriented as follows, touch HORIZONTAL LABELS:

1980

19. The following display appears:

---

```
CURRENT LABEL IS:  <Label>
ENTER {Pen No.}{Hatch No.}LABEL FOR BAR <No.>

? ____
PRESS <CR>    (Pen No.s 1-6)
HATCH:  0=Empty, 1=Full, 2=\, 3=/, 4=X
Wide HATCH: 5=\, 6=/, 7=X
```

---

a. If the current label is correct, press RETURN.

b. If the current label is not correct, enter correct label (32 characters maximum).

(1) Select pen no. wanted and enter via the keyboard, do not press RETURN or SPACE.

(2) Select hatch type desired and enter corresponding number, do not press RETURN or SPACE.

(3) Enter the label desired for that bar and press RETURN.

20. The following display appears:

```
HEIGHT FOR <label from step 19>
          IS: <No.>
ENTER HEIGHT:  ? ____
PRESS <CR>
```

a. If the current height is correct, press RETURN.

b. If the current height is not correct, enter the correct height and press RETURN.

21. If there are more bars to enter go to Step 19, otherwise go to Step 22.

22. The following display appears:

```
HEADING:  (1) <Name>
X-TITLE:  (2) <Name>
Y-TITLE:  (3) <Name>
START-END:(4) <Start>     (5)  <end>
MJ-MN TIC:(6) <Major Tic> (7)  <Minor Tic>
 D. PLACE:(8)             (9)   GRAPH NO.: <Graph No.>

ENTER ITEM NO. ? ____          EXIT=<CR> W/O ENTRY
PRESS <CR>
```

a. If all data is correct, press RETURN and go to Step 24.

b. If an item needs correcting, enter the item number (1 through 8) and press RETURN.

23. The following display appears:

```
<item description>  :  <current entry>
<requested entry>  ?
PRESS <CR>
```

Make the correct entry, press RETURN, and go to Step 22.

24. The following display appears to allow the user to set Lower Left and Upper Right:

---

```
1. Verify Axes Box: Touch LL & UR (below)
2. Touch [CONTINUE] if OK, otherwise...
3. For New Values Touch [MOVE PEN] then
    a. Position Pen With Arrow Keys
    b. Touch  _________  [UPPER RIGHT]
or            | ENTER |  <x-coord,y-coord>
    c. Touch  |_______|  [LOWER LEFT]
    d. Go to step no. 1 (above)
```

---

a. determine the location fo the lower left and upper right by touching the LOWER LEFT and UPPER RIGHT keys in the display.

b. if LL & UR coordinates are OK touch CONTINUE and go to step no. 25.

c. if new LL & UR coordinates are wanted touch MOVE PEN and position pen using the display below:

---

```
     Pen Position:  <x-coord.>,<y-coord.>
TOGGLE   or   TOUCH TO MOVE PEN
_____________________________________
|      |     |     |     |     |     |
| FAST |  ^  |  |  | V  | <-- | --> |
|      |     |  |  |     |     |     |
_____________________________________
 SPEED   UP   DOWN   LEFT  RIGHT
[PEN UP] [PEN NO.] [BELL] [EXIT]
     Remember: Check Paper & Pen
```

---

d. after positioning pen with above display touch EXIT.

e. then enter the coordinates by touching ENTER followed by either LOWER LEFT or UPPER RIGHT depending on which coordinate is being entered.

25. The following display appears:

---

1. INSERT PLOTTING PAPER
2. REMOVE CAP FROM PEN
3. CHECK FOR PROPER PEN INSERTION
4. VERIFY CHART CLAMP IS DOWN

TOUCH SCREEN WHEN READY TO CONTINUE

---

a. Verify items 1 through 4.

b. Touch the screen.

26. The following display appears:

---

PLOT AXES?

| YES | NO |
|---|---|

TOUCH APPROPRIATE BLOCK

---

a. If the axes have not been plotted before, and you want to plot them now, touch YES and go to Step 27.

b. If it is not necessary to plot the axes, touch NO and go to Step 29.

27. The following display appears while the X and Y axes are being plotted:

---

AXES ARE BEING PLOTTED

---

28. Y axis is tic marked and tics are labeled

29. The following display appears:

```
PLOT  BARS?

  YES        NO

TOUCH APPROPRIATE BLOCK
```

If the bars are to be plotted touch YES, if not touch NO.

30. The following display appears while the bars are being plotted:

```
BARS ARE BEING PLOTTED
```

31. The following display appears:

```
LABEL BARS?

  YES        NO

TOUCH APPROPRIATE BLOCK
```

a. If the bars have not been labeled and you want to label them now, touch YES and go to Step 32.

b. If it is not necessary to label the bars now, touch NO and go to Step 33.

32. The following display appears while the bar labels are being plotted:

```
BARS BEING LABELED
```

33. The following display appears:

```
        IDENTIFY CHART?

    ---------    ---------
       YES           NO
    ---------    ---------

    TOUCH APPROPRIATE BLOCK
```

a. If the labels have already been plotted, or are not wanted, touch NO and go to Step 37.

b. If the labels have not been plotted and you want to plot them now, touch YES .

34. The following display appears:

```
    <label 4>    <label 5>
    <label 6>    <label 7>

    ---------------    ---------------
      ENTER NEW          USE EXISTING
      IDENTIFIERS        IDENTIFIERS
    ---------------    ---------------

    <label 8>

    TOUCH APPROPRIATE BLOCK
```

a. If the current identifiers are correct touch USE EXISTING IDENTIFIERS and go to Step 36.

b. If the identifiers need updating touch ENTER NEW IDENTIFIERS.

35. The following display appears:

```
    CURRENT LABEL <No.> IS:  <label>
    ENTER
    PRESS <CR>
```

a. If the label is correct, press RETURN.

b. If the label is not correct, enter the new label (32 characters maximum), press RETURN.

c. If all the labels have been entered go to step no. 34, if not go to part 33a.

36. The following display appears:

---

PLOTTING IDENTIFIERS

---

The identifiers are plotted; the plot is finished.

37. The following display appears:

---

CURRENT LABEL 9. IS: <label>
ENTER
PRESS <CR>

---

a. Label 9. is a label that the user can place any where on the chart to emphasize or explain a particular aspect of that chart. Simply enter the desired label via the keyboard and press return.

b. If Label 9. is not going to be used, press return without any entry.

38. The following display appears:

---

PRINT LABEL 9?

| YES | NO |
|---|---|

TOUCH APPROPRIATE BLOCK

---

a. Touch yes if this label is to be printed.

b. Touch no if this label is to be omitted.

39. The following display appears:

```
PLOT IS FINISHED
SELECT NEXT PROGRAM?

   ANOTHER BARPLOT          MENU

TOUCH APPROPRIATE BLOCK
```

a. Touch the appropriate selection.

b. If MENU was touched, go to the user instructions for MENU in Section 2.

c. If ANOTHER BARPLOT was touched, go to Step 1.

## 6-8. EXAMPLE BAR PLOT

6-9. Figure 6-1 shows an example bar plot.

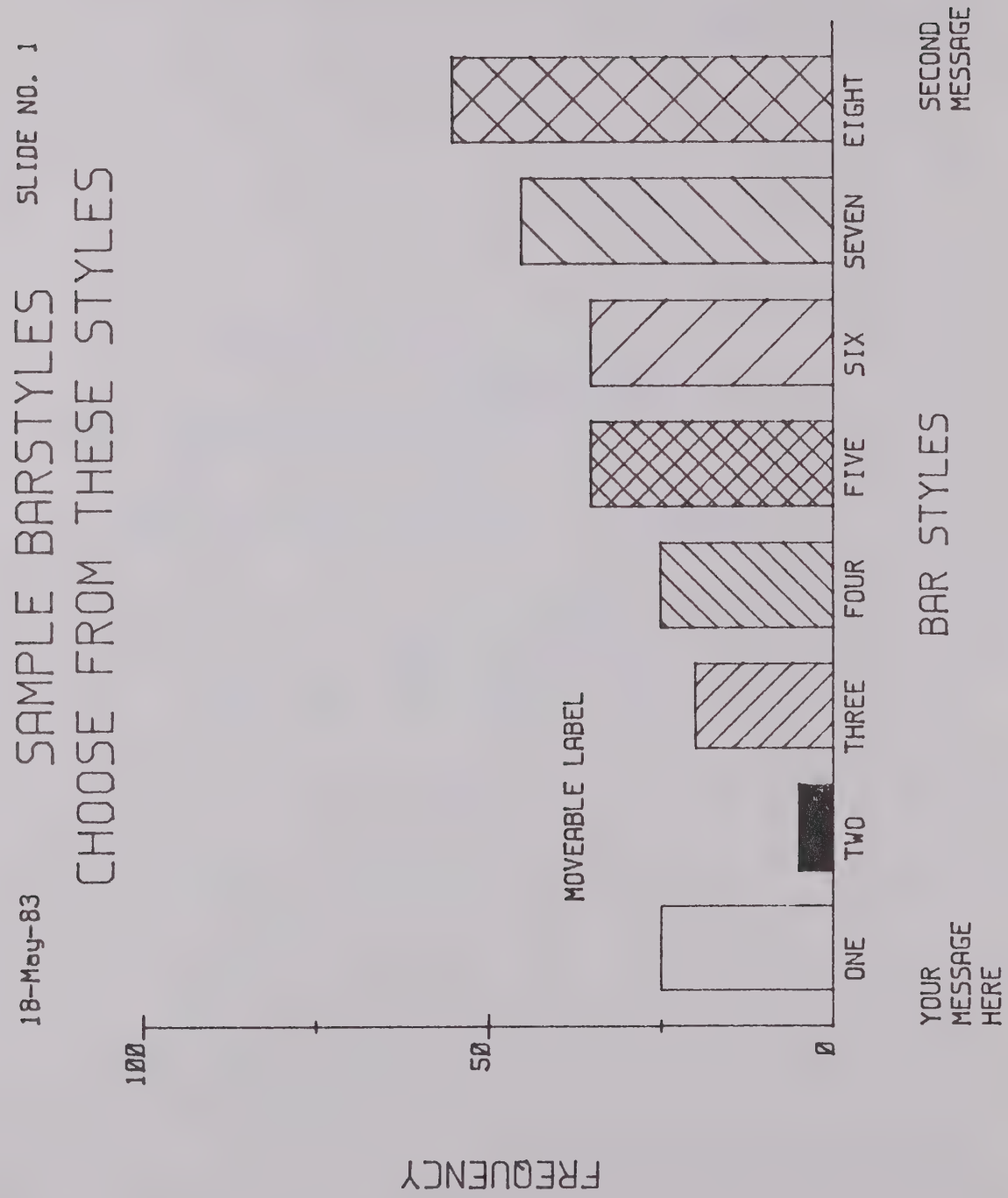



Figure 6-1. Example Bar Plot

Section 7
Plotting Histograms

## 7-1. INTRODUCTION

7-2. The programs BARPLT and XYPLOT are both used to construct a histogram. BARPLT is used to plot the bars, axes titles, and other identifying information. XYPLOT is used to plot and tic the axes and to plot the envelope curve (optional). Set up data and presentation data for a histogram can be stored in the BARPLT and XYPLOT directories with the exception of the X-Y coordinates for the envelope curve which must be entered via the keyboard or generated by a program similar to USERS1 or USERS2. Since this is a plotting package and not a statistical package, the cell-by-cell data breakdown must be provided by the user.

## 7-3. USER INSTRUCTIONS

7-4. Use the following procedure to plot a histogram:

1. Select BARPLT from the MENU.

2. Enter all the data and run the program using the BARPLT instructions (Section 6) with the following exceptions:

   a. In Step 17, touch either label position since the labels won't be plotted anyway.

   b. In Step 19, enter "HISTOGRAM" for the first label.

      1) Spelling must be exact.

      2) Label the other bars by their number (for example, TWO, THREE, etc.) just to keep track of the bars.

   c. In Step 24, when checking LL & UR note and remember the coordinates for these two points.

   d. In Step 26, touch NO; do not plot the axes.

   e. In Step 31, touch NO; do not label the bars.

   f. In Steps 33 through 36, enter and plot the identifiers (ignore the legend).

   g. In Step 37, touch NO; do not print the legend.

h. In Step 40, touch MENU.

3. Select XYPLOT from the MENU.

4. Enter data and run the program using the XYPLOT instructions with the following exceptions:

a. In Step 3, select an AVAILABLE file. If no files are available, select a file number and touch KILL to make a file available.
b. In Step 9, touch LINEAR.

c. In Step 12, enter the lower range value for X-axis start.

d. In Step 13, enter the upper range value for X-axis end.

e. In Step 14, enter the lower range value for intersection.

f. In Steps 15 and 16, enter the cell width for both tics.

g. In Step 17, enter the number of decimal places desired in cell labels.

h. Set the Y-axis up the same as was done for the BAR PLOT.

i. In Step 19, touch (6) for a symbol-less envelope curve.

j. In Step 20, touch (0) for a smooth envelope curve.

k. In Step 23 check that LL & UR cordinates are the same used when the bars were plotted. If they aren't move the pen and enter new values.

l. In Step 25 where the display is PLOT AND TIC AXES?, touch YES.

m. In Step 26, touch KEYBOARD ENTRY.

m. In Steps 27 and 28, decide upon the points through which you want the envelope curve to pass.

1) Enter the x and y coordinates for each point from left to right.

2) See the Example X-Y Curve Plot at the end of this section.

NOTE

If an envelope curve is not needed, enter 0 for "NO. OF DATA PAIRS TO PLOT".

Note that the number of points equal the number of bars + 2, and X values are axis start, halfway points on each bar, axis end.

n. In Step 33 where the display is PLOT IDENTIFIERS?, touch NO.

## 7-5. EXAMPLE X-Y ENVELOPE CURVE WITH HISTOGRAM PLOT

7-6. Table 7-1 lists the X-Y coordinates for an example curve plot. Figure 7-1 shows the resulting curve plot.

Table 7-1. Histogram Coordinate Data For X-Y Curve Plot

| X COORDINATE | Y COORDINATE | BAR NO. |
|---|---|---|
| .010 | 0 | |
| .015 | 0.2 | 1 |
| .025 | 0.8 | 2 |
| .035 | 2.0 | 3 |
| .045 | 3.8 | 4 |
| .055 | 7.0 | 5 |
| .065 | 10.7 | 6 |
| .075 | 13.3 | 7 |
| .085 | 15.0 | 8 |
| .095 | 13.3 | 9 |
| .105 | 10.7 | 10 |
| .115 | 7.0 | 11 |
| .125 | 3.8 | 12 |
| .135 | 2.0 | 13 |
| .145 | 0.8 | 14 |
| .155 | 0.2 | 15 |
| .160 | 0 | |

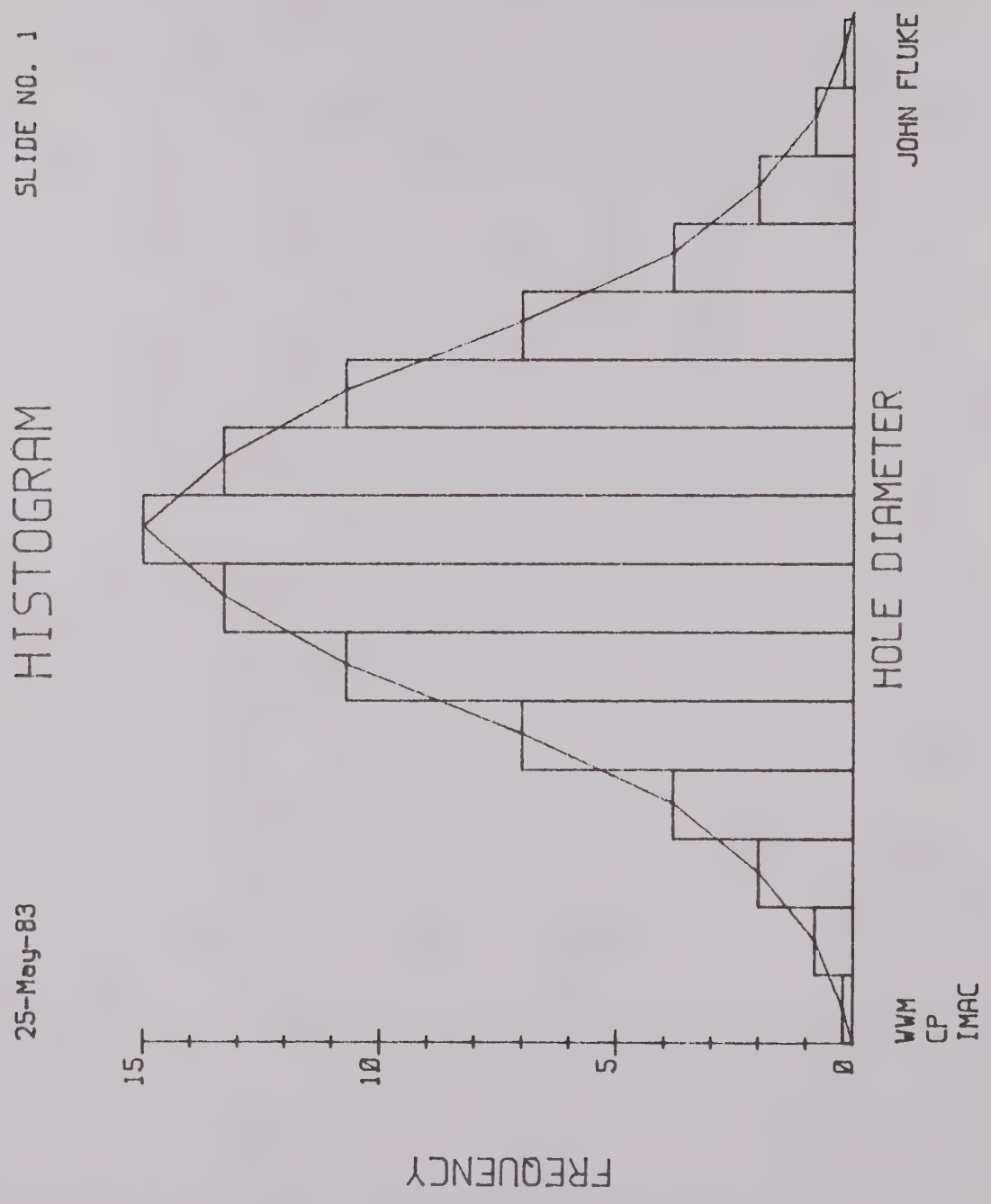



Figure 7-1. Example X-Y Envelope Curve With Histogram Plot

Section 8
Plotting Labels

## 8-1. INTRODUCTION

8-2. This program enables the user to place additional labels at any location on a graph or chart.

- The user must manually move the plotter pen to the desired location for the label using the Controllers Touch Sense panel.
- Labels may be as long as 38 characters.
- Three sizes of text are available.
- Labels may be left justified, right justified or centered at the pen position.
- Any of four text plotting directions are available.

## 8-3. USER INSTRUCTIONS

8-4. After this program has been selected from the menu, the following messages are displayed in the sequence shown:

---

LABELS PROGRAM NOW LOADING

---

---

LABELS PLOTTER PROGRAM
IS NOW IN MAIN MEMORY

---

```
1. VERIFY IEEE CABLE IS CONNECTED
2. VERIFY PLOTTER ADDRESS IS 5(00101)
3. VERIFY PLOTTER LINE SWITCH IS ON
4. TOUCH SCREEN WHEN READY
```

1. Verify items 1 through 3 from the last display. Refer to the user instructions for the MENU program if you need help in verifying these items.

2. Touch the screen

   a. The Controller beeps.

   b. If no IEEE Bus error is displayed, go to Step 3.

   c. If an IEEE Bus error is encountered, the following display appears for one second:

```
IEEE 488
ERROR ENCOUNTERED
```

   d. Go to the IEEE Error Handler material in Appendix A then return to the next step of this procedure (Step 3).

3. The following display appears:

```
                PLOTTER TEXT MENU

 ________________   ________________   ________________

   MOVE<dir>            RESET            <LF><CR>

 ________________   ________________   ________________

 ________________   ________________   ________________

      SMALL             RJustify            EXIT

 ________________   ________________   ________________

TOUCH & TOGGLE THE TEXT OPTIONS
```

These boxes represent the following options:

| | | |
|---|---|---|
| Text Direction | Plotter Reset | Line Feed, Carriage Ret. |
| Character Size | Justify or Center | Ready to Enter Text |

a. Do not touch the EXIT box yet. Instead, toggle through each of the other five boxes displayed to describe the type of label you want.

b. When the display describes your text selection, touch the EXIT box.

EXAMPLES:

| | | |
|---|---|---|
| MOVE ^^ | RESET | NO LF/CR |
| MEDIUM | CENTER | EXIT |

Yields: medium size characters centered around the original pen location plotted from the bottom to top. After plotting the text, the pen is returned to the original position.

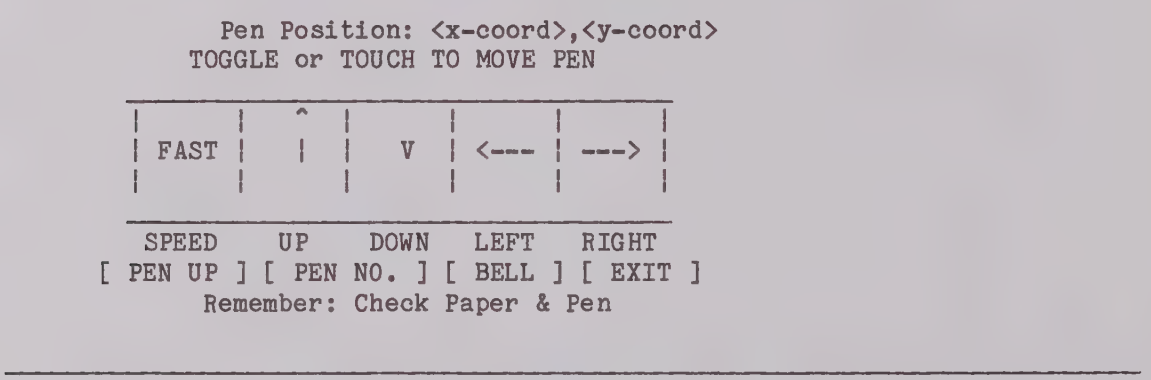
| | | |
|---|---|---|
| MOVE VV | RESET | NO LF/CR |
| LARGE | RJustify | EXIT |

Yields: large size characters right justified at the original pen location plotted from top to bottom. After plotting the text, the pen is returned to the original position.

| MOVE >> | RESET | <LF><CR> |
|---|---|---|
| SMALL | LJustify | EXIT |

Yields: small size characters left justified at the original pen location plotted from left to right. After plotting the text, the pen is located one line below the original position.

4. The following display appears:




a. position pen to desired location by touching the proper direction arrow on the Controller screen. Fine adjustments can be made be toggling the speed indicator to SLOW.

b. straight lines may be made by touching the PEN UP button.

c. different pens may be selected by touching the PEN NO. button.

d. the beep may be suppressed by touching the BELL button.

e. touch EXIT when pen is positioned.

5. The following display appears:

```
ENTER TEXT TO BE PLOTTED

? ____

TEXT MENU: Press RETURN (w/o text entry)
PROGRAM MENU: Press CTRL C
```

a. enter text label to be plotted

c. Press RETURN.

d. The label is plotted.

e. If there are more similar labels go to Step 5a of this procedure.

f. If the text choices need to be changed, perform the following steps:

1) Make no entry.

2) Press RETURN.

3) Go to Step 3.

g. To return to program MENU, simultaneously press CTRL and C.

## 8-5. EXAMPLE LABEL PLOTS

8-6. Figure 8-1 shows some example label plots.

Figure 8-1. Example Label Plots

Section 9
Plotting Text

## 9-1. INTRODUCTION

9-2. The information in this section describes text plotting program TXTPLT. This program allows the user to plot large ammounts of text that has been created using the editor utility. The use of the editor is covered in the S1717 Editor Accessory Manual supplied with this package.

- Three sizes of text are available.
- Two different thicknesses of characters are available.
- The text can be plotted either horizontally or vertically.
- 14 lines of text (not including title) are available in the 11" horizontal mode; 19 lines in the vertical mode.

## 9-3. USER INSTRUCTIONS

9-4. After this program has been selected from the menu, the following messages are displayed in the sequence shown:

---

TXTPLT PROGRAM NOW LOADING

---

---

TXTPLT PLOTTER PROGRAM
IS NOW IN MAIN MEMORY

---

---

1. VERIFY IEEE CABLE IS CONNECTED
2. VERIFY PLOTTER ADDRESS IS 5(00101)
3. VERIFY PLOTTER LINE SWITCH IS ON
4. VERIFY PLOTTER IS IN REMOTE MODE

TOUCH SCREEN WHEN READY

---

1. Verify items 1 through 4 from the last display. Refer to the user instructions for the MENU program if you need help in verifying these items.

2. Touch the screen.

   a. The Controller beeps.

   b. If items 1 through 4 from the last display are correct, go to Step 3.

   c. If items 1 through 3 are incorrect the previous display is re-written to the screen, go to Step 1.

   d. IF item 4 is incorrect, the Controller displays "PRESS REMOTE" until the remote button on the plotter has been pressed.

3. The following display appears:

```
                    EDIT OR CONTINUE?

 ________________          ________________
|EDIT PROG. TO   |        |   TEXT O.K.    |
|ENTER NEW TEXT  |        |CONTINUE PROG.  |
 ----------------          ----------------

                TOUCH APPROPRIATE BLOCK
```

   a. Touch "EDIT PROG. TO ENTER NEW TEXT" if new text needs to be created or if the old text needs to be modified, then go to Step 13.

   b. Touch "TEXT O.K. CONTINUE PROG." if the text has already been created.

4. The following display appears:

```
ENTER <DEV:NAME.EXT> OF TEXT FILE
WHICH WAS ENTERED VIA ESX.CIL
?
```

   Enter the DEV:NAME.EXT of the text file via the keyboard followed by a <return>. If the device is SY0: this may be omitted for brevity.

5. The following display appears next:

```
        SELECT CHARACTER SIZE

 _________  _________  _________
|         ||         ||         |
| SMALL   || MEDIUM  ||  LARGE  |
 _________  _________  _________

       TOUCH APPROPRIATE BLOCK
```

Select the size of text desired and touch the appropriate block on the Controller.

6. This display appears next:

```
        SELECT CHART ORIENTATION

 _______________    _______________
|               |  |               |
|11" HORIZONTAL|  | 11" VERTICAL  |
 _______________    _______________

       TOUCH APPROPRIATE BLOCK
```

Select the desired orientation for the text and touch the appropriate box on the Controller.

7. The following display appears:

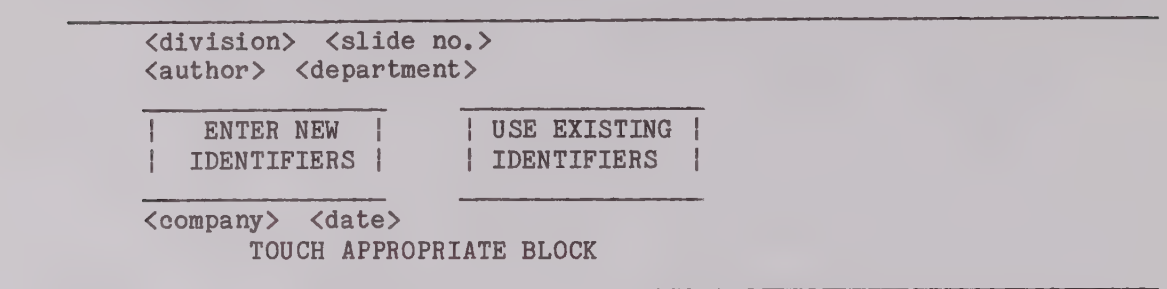
```
1. INSERT PLOTTING PAPER
2. VERIFY PAPER CLAMP IS DOWN
3. INSERT PENS

   TOUCH SCREEN WHEN READY TO PLOT
```

Verify items 1 through 3 and touch screen when ready to plot text.

8. The following screen appears while the text is plotted:

```
    CONTROLLER BUSY
    DRIVING PLOTTER
```

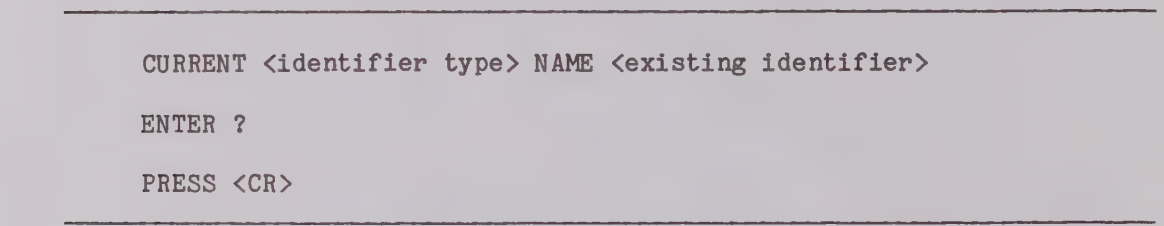
9. When the text to be plotted is nearing completion this screen appears:




a. If the existing identifiers are correct touch "USE EXISTING IDENTIFIERS" and go to Step 11.

b. If the identifiers are not correct or need to be modified touch "ENTER NEW IDENTIFIERS".

10. The following display appears next:




a. If the existing identifier is correct press <return>

b. If the existing identifier needs to be modified complete the following instructions.

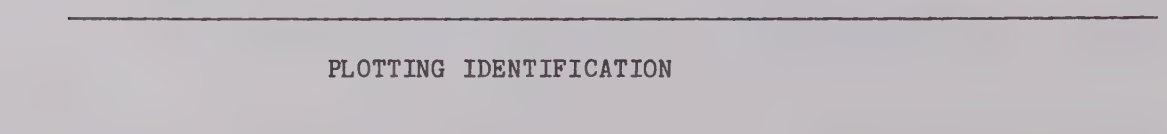
   (1) Enter the correct identifier.

   (2) Press <return>.

c. If all the identifier types have been modified go to the next Step. Otherwise go back to a. until all identifiers have been modified.

d. Go to 9a.

11. While the identification is being plotted the following screen appears:



12. When the plot is finished the following appears on the Controller screen:

```
PLOT IS FINISHED
SELECT NEXT PROGRAM?

 ANOTHER TXTPLT        MENU

TOUCH APPROPRIATE BLOCK
```

a. Touch the appropriate selection.

b. If MENU is touched, go to Section 2 for instructions.

c. If ANOTHER TXTPLT is touched, go back to step 3 of this procedure.

13. Before new text can be created or old text can be edited the Controller prints the following message to the screen to remind the user of the proper command to envoke the editor:

ENTER <ESX DEV:NAME.EXT> <CR>

ESX is the command to envoke the editor. DEV: is the device that you want the file to reside on. NAME.EXT is the name and extention you want for the file, see the Controller system documentation for allowable file names. The Controller then exits the interpretive basic environment which is necessary before the ESX editor can be used. The format of the text file necessary for the TXTPLT program is discussed in the following Section on Input File Format. Use of the Editor is covered in the S1717 Editor Acessory Manual supplied with this package.

## 9-5. INPUT FILE FORMAT

9-6. TXTPLT assumes that the text file to be plotted is in a particular format. This format assumes that all characters in the file are printable ASCII characters. The first line of the file is the title to be printed. The title is plotted after the rest of the file has been plotted and is plotted in larger characters than the rest of the text. If no title is to be plotted a space or spaces should be entered in the first line of the file. The file should look exactly like the final copy to be plotted, that is with all commas, periods, and spaces in it. Spaces should be used instead of tabs because the plotter does not recognize tab characters. The following restrictions also apply to the file in general:

1. The file may be only 14 lines long, not including title, if the output is to be plotted in the 11" horizontal mode. In the 7" vertical mode 19 lines, not including title, are available.

2. Lines may be 50 characters long in the horizontal mode, and 38 characters in the vertical mode.

3. Titles may contain 40 characters in the horizontal mode, and 30 characters in the vertical mode.

If any of these restrictions are exceeded, the extra characters are simply not plotted.

9-7. EXAMPLE TEXT PLOT

9-8. Figure 9-1 shows an example text plot.

# THE TITLE IS ALWAYS FIRST

Then the text follows.

```
FFFFF  L      U   U  K   K  EEEEE
F      L      U   U  K  K   E
FFF    L      U   U  KK     EEE
F      L      U   U  K  K   E
F      LLLLL  UUUUU  K   K  EEEEE
```

Figure 9-1. Example Text Plot

# Appendix A
# Application Information

## A-1. INTRODUCTION

Application information such as Recovery Techniques and Transfering Files To Another Disk are provided in this appendix.

## A-2. EASY DUPLICATION OF SETUP DATA

Obviously, when several sets of bars or curves are to be stacked on a single graph, most of the data will be identical. Rather than enter the same data two or more times, the following technique is suggested. A bar graph set up is used in this example. An X-Y plot graph (GRAPH0.XYC) is handled similarily.

1. Enter the data for the first set. (This example assumes you picked 0 from the directory (file name GRAPH0.BAR).

2. Assuming you would like this same data in GRAPH1.BAR:

   a. Run the program far enough to have entered the heading for GRAPH1.BAR.

   b. Simultaneously press CTRL and C.

   c. The screen displays the following:

      "Ready"

   d. Simultaneously press CTRL and P.

3. The following is displayed:

```
^P
Console Monitor Version <No.>  <time><date>
#
```

4. Replace the Plotter Pack Disk with a floppy disk which contains the FILE UTILITY PROGRAM "FUP".

5. Enter FUP <CR>.

6. The following is displayed:

   *

7. Replace the floppy disk with the Plotter Pack Disk.

8. Enter the following:

   GRAPH1.BAR=GRAPH0.BAR/B <CR>

9. The following is displayed when copying is complete:

   *

10. Press RESTART.

11. The MENU is displayed.

12. Select BARPLT.

13. Select 1, i.e., GRAPH1.BAR.

14. Enter the bar heights; all the rest of the data is already there. Note - you will have to change the legend when the program gives you that opportunity.

## A-3. TRANSFERRING FILES TO ANOTHER DISK

Use the following procedure to transfer files to another disk:

1. After the MENU is displayed, simultaneously press CTRL and C.

2. Shutdown instructions are displayed. Touch the screen.

3. The following is displayed:

   "Ready"

4. Simultaneously press CTRL and P.

5. The following is displayed:

   ^P Console Monitor Version <No.> <Time><date>
   #

   FUP, the File Utility Program can now be entered to transfer, delete, and rename any file as necessary. For information on use of FUP refer to the Controller System Guide.

## A-4. RECOVERY PROCEDURES

### A-5. Introduction

The following procedures tell how to interrupt the program and recover from innappropriate plotter operation.

### A-6. Interrupting the Program

Complete the following procedure to stop in the middle of a program and start over again at the beginning of the program section that is currently in main memory:

1. On the Controller Programmer Keyboard, enter <CTRL>/<C>.

2. The following is displayed:

   Stop at line <line no.>
   Ready

3. Enter RUN <CR>

4. The program starts running from the start of the current section in main memory.

5. Complete the following procedure if you find the program at the beginning of its second half and you would prefer to start at the beginning of the first half:

   a. Enter <CTRL>/<C>.

   b. The resulting display is:

      Stop at line <line no.>

      Ready

   c. Make one of the following entries:

      1) Enter RUN " (program name) " <CR>. Where the possible programs names are as follows:

         PLTDRV
         XYPLOT
         XYPLT2
         BARPLT
         BRPLT2
         PIEPLT
         LABELS
         TXTPLT

      2) Enter RUN "MENU" <CR>.

3) Press <RESTART> on the front of the Controller to display the menu.

## A-7. Inappropriate Plotter Operation

Use the following procedure to clear the plotter from inappropriate operation such as plotting irrelevant symbols, unwanted data, etc.:

1. Follow the instructions above in section A-6 for interrupting the Controller and restart the desired program.

2. Turn the plotter off and then on again, or press the RESET and the REMOTE buttons on the front panel of the plotter.

3. Remove the pen from the plotter arm and replace it in its pen stable if you have the six pen option.

## A-9. PLOTTER PACK PROGRAM SPECIFICATIONS

The following list defines the specifications of the plotter pack program:

1. COMMND.SYS

   The COMMND.SYS program provides for entry of time and date and runs the MENU program. Press RESTART to execute COMMND.SYS.

2. MENU

   The MENU program has the following functions:

   a. Display the program selection.

   b. Provide for program selection via the Touch-Sensitive Overlay.

   c. Provide "power down" instructions.

   d. Display confirmation that the selected program is being loaded.

   e. RUN the selected program.

3. PIEPLT

   a. The purpose of the PIEPLT (Pie Plot) program is to plot a pie chart of up to 16 pieces (inclusive) in either of two orientations and plot the following information:

      1) Piece percentages

      2) Piece labels

      3) Slide Number

      4) Division Name

5) Author

6) Date

7) Department name

8) Company Name

b. Touch-sense input to be used in lieu of keyboard entry wherever feasible. The user has the option to re-run the program or select MENU when plotting is finished.

c. The necessary functions of the PIEPLT program are as follows:

1) IEEE Bus check

2) IEEE error handler

3) Virtual array storage for data with the following characteristics:

a) Ten files for storing data: "PIECE0.PIE" through "PIECE9.PIE".

b) Displayed storage directory with the capability of selecting, creating and killing storage files via Touch-Sensitive Overlay entries (directory editing).

4) Entry and editing for the following:

a) Pie data

b) Identifying data (virtual arrays)

5) Plotter scaling

6) Paper and pen check

7) Error handler for data entry

8) Interrupt routine to close virtual array files

9) Touch-sense wait loop

10) Touch-sense graphics

11) Zeroing of variables

4. PLTDRV

a. The purpose of the PLTDRV (Plotter Driver) program is to be chained in by the user's program, linearly plot user's X-Y data, then chain back the user's calling program.

b. The following information to be supplied as virtual arrays by the user's program:

   1) Titles for the following:

      a) Heading

      b) X-axis

      c) Y-axis

   2) Flag for printing or supressing axes and titles.

   3) Dimension size of the data array.

   4) The number of points to plot.

   5) The XC array for X coordinates.

   6) The YC array for Y coordinates.

c. The Plotter Driver analyzes the user's data and decides axes limits, point of axes intersection (if the data is + and -, the intersection should be through zero), size of major and minor tic marks as well as tic label number format.

d. Axes should be plotted with major and minor tic marks. Only the major tic marks should be labeled with numbers. Maximum number of major tic marks is 12. Maximum number of minor tic marks is 10.

e. Data points should be marked except if the number of points exceeds 25, in which case the data point will not be marked. Data points should be connected with a continous line. Driver should be capable of plotting data in any or all of the four quadrants for the range of numbers the Controller is capable of outputting.

f. Titles, date and time are to be plotted.

g. The Plotter Driver assumes the user's calling program will check paper and pen and the bus before calling PLTDRV.

h. All plotting parameters should be programmed as variables to allow easy modification of the program. Subroutines are modularized so their code may be extracted and used in other programs the user may want to write.

i. The necessary functions of the PLTDRV program are as follows:

   1) Plotter Scaling.

   2) Interrupt routine to close virtual array files.

5. XYPLOT and XYPLT2

a. Purpose:

1) The purpose of XYPLOT and XYPLT2 is to provide an interactive plotting routine for X-Y data. The programs allow the user to customize an X-Y plot using X-Y data entered from the keyboard or a storage device (X-Y data must be stored as virtual arrays). The user has the capability of plotting multiple lines on the same graph. Touch-Sense Keys are to be used in lieu of keyboard entry wherever feasible. The user has the option to re-run program or select MENU when plotting is finished. The user decides on and enters the following plotting parameters for each axis:

a) Scaling (log or linear)

b) Log axis parameter entries are as follows:

(1) Axis starting point

(2) Axis ending point

c) Linear axis entries are as follows:

(1) Axis starting point

(2) Axis ending point

(3) Point where axes intersect

(4) Major tic length

(5) Minor tic length

(6) Number of decimal places in tic labels

d) There are 6 point symbols available from the 1771A plotter.

e) Line style is the seven lines available from the 1771A plotter.

2) The user enters the following identifying data:

a) Heading title

b) X-axis title

c) Y-axis title

d) Slide number

e) Author

f) Department

g) Division

h) Company

3) Other identifying data are DATE$ (Controller system variable) for plotting the date.

b. Necessary Functions:

The necessary functions of XYPLOT and XYPLT2 are as follows:

1) IEEE Bus checks

2) IEEE error handler

3) Virtual array storage for set-up data with the following characteristics:

a) Ten files for storing data: "GRAPH0.XYC" through "GRAPH9.XYC".

b) Displayed storage directory with the capability of selecting, creating and killing storage files via touch-sense entries (directory editing).

4) Entry and editing for all data

5) Plotter scaling

6) Paper and pen check

7) Error handler for data entry

8) Interrupt routine to close virtual array file

9) Touch-sense wait loop

10) Touch-sense graphics

11) Zeroing of variables

12) Format selection for tic labels

13) Valid data test

14) Storage of LOWER LEFT and UPPER RIGHT in virtual array for use after power down or program chaining.

6. BARPLT and BRPLT2

a. Purpose:

1) The purpose of BARPLT and BRPLT2 is to plot a bar chart of up to 16 bars (inclusive). The user has the option of filling in bars. Program to have the capability of stacking several sets of bars on the same graph with legends. The user has the option of placing bar labels inside, below or above the bars or omitting labels. The bars are to be symmetrically placed and evenly spaced. The user has the option of plotting bars with no intervening spaces in order to produce a histogram in combination with the X-Y interactive plotting program.

2) The following identifying information should also be input by the user and plotted by the program.

a) Slide number

b) Division name

c) Author

d) Department

e) Company

f) Heading title

g) Y axis title

h) X axis title

i) Bar legend

3) The Date should be plotted as input from DATE$.

4) Touch-Sense Keys are to be used in lieu of keyboard entry wherever feasible. The user has the option to re-run the program or select MENU when plotting is finished.

5) The user decides on and enters the following plotting parameters for the linear Y axis:

a) The axis starting point

b) The axis ending point

c) The major tic length

d) The minor tic length

e) The number of decimal places in tic labels

b. Necessary Functions:

The necessary functions of the BARPLT and BRPLT2 programs are as follows:

1) IEEE Bus check

2) IEEE error handler

3) Virtual array storage for data with the following characteristics:

   a) Ten files for storing data: "GRAPH0.BAR" through "GRAPH9.BAR".

   b) Displayed storage directory with the capability of selecting, creating and killing storage files via touch-sense entries (directory editing).

4) Entry and editing for the following:

   a) Bar data

   b) Identifying data

5) Plotter scaling

6) Paper and pen check

7) Error handler for data entry

8) Interrupt routine to close virtual array files

9) Touch-Sensitive Overlay wait loop

10) Touch-Sensitive Overlay graphics

11) Zeroing of variables

12) Valid data test

13) Storage of LOWER LEFT and UPPER RIGHT in virtual array for use after power down or program chaining.

## A-10. DISK DIRECTORY

The following listing is a directory of the 1771A Plotter Package Floppy Disks.

```
Directory of MF1: on  0-Jan-72 at 02:36
 Name .Ext    Size     Date
FDOS  .SYS    16   17-May-83
CONMON.SYS     2   17-May-83
TIME  .CIL     3   17-May-83
FUP   .CIL     9   17-May-83
BASIC .CIL    53   17-May-83
COMMND.SYS     1   17-May-83
NOTE  .BAL     2   17-May-83
MENU  .BAL     5   17-May-83
USERS1.BAL     7   20-May-83
USERS2.BAL     3   17-May-83
PLTDRV.BAL    24   23-May-83
PLTDRV.BAS    42   24-May-83
XYPLOT.BAL    26   24-May-83
XYPLT2.BAL    34   24-May-83
BARPLT.BAL    21   24-May-83
BRPLT2.BAL    32   24-May-83
DIRECT.XYC     1   24-May-83
DIRECT.BAR     1   24-May-83
BOIL1 .VRT     1   24-May-83
BOIL2 .VRT     1   24-May-83
BOIL3 .VRT     1   24-May-83
GRAPHO.XYC     1   24-May-83
GRAPH1.XYC     1   24-May-83
GRAPH2.XYC     1   26-May-83
GRAPHO.BAR     2   26-May-83
GRAPH1.BAR     2   26-May-83
DRVSET.VRT     1   26-May-83
ARRAY1.VRT     1   26-May-83
ARRAY2.VRT     6   26-May-83
LOGDAT.VRT     1   26-May-83
Total of 301 blocks in 30 files; 97 free blocks.
```

```
Directory of MF1: on  0-Jan-72 at  0:10
 Name .Ext    Size     Date
FDOS  .SYS    16   17-May-83
CONMON.SYS     2   17-May-83
TIME  .CIL     3   17-May-83
FUP   .CIL     9   17-May-83
BASIC .CIL    53   17-May-83
COMMND.SYS     1   17-May-83
NOTE  .BAL     2   17-May-83
MENU  .BAL     5   17-May-83
ESX   .CIL    45   17-May-83
IE3ERR.DAT     1   17-May-83
PIEPLT.BAL    30   23-May-83
LABELS.BAL    15   26-May-83
TXTPLT.BAL    20   23-May-83
DIRECT.PIE     1   17-May-83
PIECE0.PIE     2   25-May-83
PIECE1.PIE     2   25-May-83
TEST  .TXT     1   25-May-83
Total of 208 blocks in 17 files; 190 free blocks.
¿¿'
```

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